

Handbook of
Project Finance
for
Water and Wastewater
Systems

Michael Curley

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Dedication

To my mother, Lucy Alford Curley, who for twenty years was the Treasurer of the City of Buffalo, New York, and who taught me the rudiments of public finance as well as the importance of sound financial practices.



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Introduction

This book is written for the non-financial executive. It is designed for the directors and managers of water and wastewater systems, who do not deal with project finance on a day-to-day basis.

Many people think that finance is a subject akin to black magic. Rubbish. There is no magic to it at all. It is a straightforward science, and a fairly simple one at that. Even for people who think they are "not good with numbers."

Being elected to the Board of Directors of a water or wastewater system is, indeed, an honor. Likewise, being chosen to manage such a system is also an honor. But this honor carries with it a mandate. Each member of the board of directors and each manager of a water or wastewater system has a firm obligation to the system's users to provide quality service at reasonable rates. This mandate implies financial determinations. It applies to the day-to-day operation of the system. It also applies to capital improvement projects undertaken by the system. You can't run a water or wastewater system without being able to make sound financial judgements.

Reckoning the quality of day-to-day service against its cost is a fairly straightforward proposition. One needn't be a chemist, an engineer, or a financial expert to be an effective board member or general manager. Reckoning the benefits and cost effectiveness of a major capital project, on the other hand, can sometimes seem absolutely daunting. But it is not. It lends itself readily to the type of analysis which even "non-financial types" can easily get comfortable with.

The subject of the book is the funding of capital projects, which are projects to improve, expand or renovate the physical facilities of a system. Collectively, these will be called: capital improvement projects.

Major system improvements do not happen every day. The programs and procedures for funding such projects are somewhat abstruse and technical. Directors who are elected to govern a water or wastewater system and even the professional managers responsible for the day-to-day operations of the system can't possibly have firsthand familiarity with the intricacies of capital funding programs. Nor are they expected to. After

all, systems normally only embark on such projects every five to ten years. No one can be expected to be up to date on matters of such infrequent occurrence. This book is, therefore, designed to give those busy executives the necessary background to be able to analyze and understand the various capital funding programs available to water and wastewater systems, to be able to compare them, and to be able to make sound financial decisions concerning such projects.

Necessarily, this book will probably be of greater value to the management of small water and wastewater systems. They will generally not have the luxury of staff whose only responsibility is finance, much less project finance. Also, because of the small size and relative infrequency of projects, these managers will not be the subject of the intense affection and interest which bankers and Wall Street types traditionally lavish on the managers and directors of large systems when they sense the possibility of a big fee. Small systems don't produce big fees. This is, indeed, unfortunate because a great deal of free information and advice can be had from the financial community, which could be of great help to small system managers.

In addition, the book should also be of good service to the directors of larger systems. The problems are the same, and the analyses are certainly the same for both big and small systems. Directors of larger systems may find this book useful in analyzing financial options put forth by their staffs and in posing questions to their financial advisors, consultants, investment bankers, and the like. They have the same duty to system ratepayers as do directors of smaller systems. To the extent that this book can help directors of large systems come to an informed judgment, it will facilitate the discharge of that duty. For, indeed, the only thing small about small water and wastewater systems is their size. The responsibilities of the system's management are the same whether a system has 100 or 1,000,000 users. Directors and managers have the same legal and moral mandate to provide their users with quality service at reasonable rates.

When it comes to capital improvement projects, the management of water and wastewater systems have four discreet obligations to their ratepayers. First, the project must be effective; i.e., it must solve the problem at hand or meet the intended need. Second, the project must be done in a workmanlike manner so that it will last, in good working order, over its intended service life. Third, the project cost must include only necessary elements and those must be at reasonable prices. And, fourth, it must be financed in the most cost effective manner in order to minimize the actual financial impact on the system's ratepayers.

This book deals with this latter duty: to finance the system's needs in the most cost-effective manner, so that the impact on system ratepayers is absolutely minimized.

The book is divided into three major sections. The first section will present the two tools which are necessary for any type of analysis of capital project funding. These are: the methods of comparing costs, and the method of converting dollars into rates, and vice versa. The first section will conclude by presenting the two most commonly used (and most sensible) methods of comparing financing programs: annual cost and total cost.

The second major section deals with seven factors which can have a dramatic effect on annual cost and total cost. Annual cost can be defined as how much system ratepayers have to pay for their project each year. Total cost has to do with how long they have to pay for it. These seven factors are:

- 1.) Term of payment. The number of years over which the loan principal for a project is repaid.
- 2.) Rates. The interest rate at which the bond is issued or the loan is made.
- 3.) Financing costs. The up-front costs which must be added to the bond or loan principal, and the annual charges which are added to the interest rate.
- 4.) Delay. The effect of delays on both project cost and financing cost.
- 5.) Imposed costs. These costs are those additional charges which are extrinsic to the project but are required by the terms of a particular financing program.
- 6.) Ineligibility. The costs which cannot be financed by the loan or bond, and, hence, must be paid for otherwise.
- 7.) Coverage. The amount, if any, by which the ratepayers' annual payments must exceed the annual debt service due.

It is important to realize that there are three ways in which a water or wastewater system can be adversely affected by the particular financing approach chosen.

First, project costs may be inflated. Factors three, four and five, above, address this point. Sometimes additions to project cost are absolutely necessary and sometimes they may not necessarily result in either higher annual debt service payments nor in higher charges to

system users. But additions to project cost must be accurately identified and factored into the decision making process.

Second, true annual debt service costs must be rigorously ascertained. As you will see below, sometimes a higher project cost will not result in higher annual debt service payments. This is due to differences in the Rates (Item #2, above) and the Terms (Item #1, above) of particular financing programs.

Third, both higher project costs and higher annual debt service payments may still result in lower annual charges to system users. This may be due to the fact that less expensive programs may exclude certain costs, which must then be financed by other more expensive means, making the less expensive program more costly overall. Factors six and seven, above, discuss this possibility.

All of these circumstances -- where higher really means lower -- may seem at first paradoxical. But they are not. They become obvious once you analyze all financial alternatives using the same approach and the same criteria in each instance.

The third section of the book presents the four most frequently used programs for financing the capital improvement projects of water and wastewater systems. These are:

- 1.) Municipal Bonds.
- 2.) Commercial Bank Loans. Both taxable and tax-exempt.
- 3.) The Water and Waste Disposal Program (WWDP) of the Farmers Home Administration (FmHA) of the U.S. Department of Agriculture (USDA).
- 4.) The U.S. Environmental Protection Agency's (EPA) State Revolving Fund (SRF) Program for wastewater projects only.

As each program is presented, it will be fully described. Then it will be evaluated in terms of the seven cost factors presented in section two.

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Section I



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Chapter 1

Cash Available for Debt Service

This section of the book deals with what many people think is the black magic aspect of finance.

Several years ago, the Council of Infrastructure Financing Authorities (CIFA) and the U.S. Environmental Protection Agency (EPA) sponsored a conference on the financing of small water and wastewater projects. Among the presentations at the conference was one on the FmHA "buy-back" program. This program derived from the Reagan Administration's effort to reduce the federal deficit. In this case, local water and wastewater districts were offered the opportunity to "buy back" loans which they had obtained from the Farmers Home Administration (FmHA) of the U.S. Department of Agriculture. The idea, of course, was that the government would accept a discount, i.e., less than full value on the loans. This would, in turn, produce a savings which was the presumed inducement for the small systems to buy back the loans.

A distinguished investment banker was making a presentation on how systems could use tax-exempt municipal bonds to effect their buy-back. During the question and answer period at the end of the presentation, a representative of the American Water Works Association (AWWA) asked an amazing question. She first called the audience's attention to the fact that, in the banker's presentation, the old payment on the FmHA loan was precisely the same amount as the new payment on the bonds issued to buy back the FmHA loan. If the two payments were equal, she queried, where was the savings? Apart from the obviously improved age and demeanor of the questioner, the circumstance was not at all unlike

the famous Wendy's television commercial of the old lady staring at the hamburger asking: "Where's the beef?"

If the water system owed \$8,000 a month before the buy-back and still owed \$8,000 a month after the buy-back, where was the benefit to the system?

In point of fact, both the presenter and the questioner were right. The difference was in their analyses. The presenter's example had demonstrated a savings in total cost; while the questioner was looking at annual cost. Unfortunately, neither recognized the other's position in time to avoid a breakup of the session in a haze of confusion.

As we will see in the next few chapters, the wizards at the U.S. Treasury who designed the FmHA buy-back program realized that they needed a financial inducement for the small systems to buy back their loans. They could easily have structured the inducement to provide a savings in annual cost. But this would have meant less cash for the federal government. Since the goal was to raise as much money as possible, they structured the inducement, instead, to provide a savings in total cost. To the naked eye, and from the questioner's perspective, this presents no real savings at all, because the savings are not in today's payments. But, in fact, there is a savings and it is real. The investment banker was also right. On a total cost basis, the system would pay fewer dollars for the same project. So, the savings would be there; but just not in terms of what the system had to pay today.

It is precisely because of differences such as these that finance is thought of as black magic. How can less be more, or the same?

Less is not more. But it can appear to be when only looking at one aspect of a transaction. There is no black magic here, only a difference in perspective. Both annual cost and total cost can easily be measured. Once you are able to do so, the reality of the situation becomes plain. In the example above, on an annual cost basis, the FmHA loan and the bond were the same (as the questioner rightly observed); but on a total cost basis (which the investment banker presented) there really was a true dollar savings to the water district.

In the same vein, the Chairman of the Board of a major metropolitan water system recently confided his unease over a proposal brought to him by his agency's investment bankers. They proposed that his system refund some of its outstanding tax-exempt bonds. Refunding generally means replacing bonds. This can be done by either calling, i.e., redeeming, the outstanding bonds or by placing the proceeds of the new bond issue in a special account where the principal and interest, together, to be earned on the new bonds precisely equals the principal and interest,

together, to be paid on the old bonds. This latter method results in an event known by the lawyer-thrilling term "defeasance."

What was bothering the Chairman of the water system was that his bankers' proposal called for the issuance of more new bonds than were then outstanding on the old bonds. (This is not unusual.) But, at the same time, his agency's annual payments on the larger amount of new bonds were actually going to be **smaller**!

This is almost the opposite of the FmHA question. There, the annual cost was the same both before and after the transaction but the total cost was lower. Here, the annual cost is lower and the total cost is higher. The Chairman's system will wind up paying less each year; but they will continue paying for a greater number of years.

There is certainly a relationship between annual cost and total cost, but it is not linear. When one goes one way, the other does not necessarily follow.

Anecdotes like these tend to make people think finance really is black magic. Increasing the loan amount and decreasing the loan payment at the same time just doesn't seem right. It doesn't seem to make sense. There appears to be something sinister about it. But there isn't. There is a simple and straightforward answer to both the Chairman's question and the FmHA problem.

To answer these questions requires being able to compare the costs of alternative methods of financing a given project. If two investment bankers approach you with two different proposals for funding the same project, the only way the proposals can be compared is by evaluating the annual cost of each or the total cost of each. You cannot compare an annual cost with a total cost. That is where the Chairman's question and the FmHA problem come from. Annual cost and total cost are a true example of apples and oranges. They simply cannot be compared.

To properly evaluate either the annual cost or total cost of a project we must first gather some analytical tools which we will need.

The first thing we will need to learn is what funds (of the water or wastewater system) are available to pay for the project. Current funds may be insufficient. But we will only know the precise amount by which they are deficient after a thorough analysis. In addition, by identifying those exact funds which can be used to pay for projects, we are, of course, at the same time specifying either the sources of income which must be increased or the expenses which must be curtailed in order to be able to pay for the project.

Next, and most importantly, we will need to know how much we have to pay each year for the project. Notice we used the phrase "how

much we have to pay" instead of the simpler "how much it costs." This is because the term "cost" or, more commonly, "project cost" is often used in so narrow a sense that it is frankly misleading. When you hear used car dealers talk about their "low-cost" pre-owned models, you may get the uneasy feeling that the monthly payment they are talking about will be substantially different from the amount you actually wind up making the check out for each month. Rightfully so. And, unfortunately, this is often the case in the project finance business as well.

To determine how much we have to pay for a project we will need to be able to convert annual costs or charges into their one-time equivalents. We will also have to convert one-time charges or fees into annual costs. For example, if a lawyer charges a one-time fee of \$10,000, and the fee is added to the amount of a loan to pay for the project, how much will the one-time legal fee add to the annual loan payment? Conversely, a lender may charge an annual inspection fee of \$1,000 per year. How much does this add to the total project cost? To be able to convert from an annual cost to a one-time cost is not as simple as adding up all of the annual payments. Nor is converting from one-time cost to total cost as easy as dividing the one-time cost by the number of years of the loan. Unfortunately, these processes are complicated by the fact that you cannot add a dollar paid in one year to a dollar paid in another year. Here, again, is an apple and oranges problem. This leads us to the concept of discounting, by which dollars paid in different years can be reduced to the concept of "present value" dollars and can now be added readily. This subject will be covered in the next chapter. For now, let us begin by identifying the financial concepts necessary to analyze water and wastewater project costs.

* * * * *

The first concept involves determining what funds are available to pay for projects. Fortunately, the number of elements necessary to make sense out of this concept are relatively few. They are basically divided into three areas: Regular Income, Cash Expenses, and Cash Available for Debt Service.

Regular Income. The first major area to look at is income. From the point of view of project financing, the best way to look at income is as

regular income. By regular income we mean income that arises, or will arise, from the day-to-day delivery of water or wastewater services. The word "services" here is most important. Income from services means income derived from the delivery of water or the use of a sewer. Its principal characteristic, for financial purposes, is that it tends to be extremely regular and predictable.

Once a user is connected to a system, that user generally establishes a pattern of use which subsequently varies little from year to year. The more users a system has, the more reliable are the patterns of use. User payments, too, tend to be equally as predictable. Thus, a water or wastewater system with a large, stable user base develops a very predictable and highly reliable record of payments over time. This is extremely important because the more stable a data base is, the more it can be relied upon to predict how much money will be available for annual payments on a new project. History does not guaranty future events but it is certainly a good indicator of what will happen. Shakespeare is right: "What is past, is prologue."

We refer to this income as "regular" because payments are made for day-to-day service as opposed to any single or extraordinary event. Regular income is a critical element of project financing because it can be used statistically to predict future income. Irregular or, more correctly, non-recurring income cannot be used to predict future income. This is true whether the non-recurring income derives from the sale of a piece of property, or from a government grant, or from connection fees.

An important element of many systems' income derives from connection fees. Under such circumstances, the water system can be said to be underwriting part of the cost of the growth of its community. In areas where water and wastewater systems have historically issued bonds or taken out loans to finance the infrastructure of undeveloped areas, such fees may have always been considered "regular" because the system experienced regular or steady growth. Those days are probably over. Recent experiences in Texas, Louisiana and California have taught lenders that major growth cannot simply go on ad infinitum. Lending against future connection fees based on large-scale development has proven to be a risky business, but lending based on historical payment patterns for normal use is very sound. Please note that we are referring to only "major" growth here. This is because marginal growth can always be absorbed in a strong system. Systems experiencing growth of a few percent a year pose no difficulty; however, connection fees for such systems should still not be considered regular income. The acid test

of whether any growth is marginal, in the sense used here, is whether the cost of such growth can be absorbed readily by the system's current users out of regular system income. In other words, can the system still support the debt even if no new connection fees are earned by the system?

The emphasis, again, is on completely regular income. Income which is either not going to recur or is otherwise contingent on an event, such as the sale of a home or lot, is not regular income. To the extent that a system has such income, it is certainly helpful to pay the bills, but is of little or no value in financing improvements to the system.

A word about interest income. Interest income is that derived from the earnings on any funds which the system has under its control. The question then arises: Should interest income be considered "regular" income for our purposes? The answer is relative. If the fund or account on which a system is earning interest is permanent and will remain stable for at least the first few years after the new project has been built, then yes. Otherwise, no. For example, a system may have a Repair & Replacement Reserve Fund. If this fund is constantly replenished out of normal user service charges, then the expectation is clearly that the fund will always be there. In such case, a lender should be able to rely on that fund earning at least a modest amount of interest each year. If, on the other hand, a system has a fund intended to be used, for example, to extend its mains to a new subdivision, for example, then the interest on this fund should not be included in regular income because it will presumably be used for its stated purpose. Therefore, it will not be available to make annual payments on the system's new project.

We can summarize the regular income concept with a simple formula:

$$\begin{array}{r} \text{Total income} \\ - \text{Non-recurring income} \\ \hline \text{Regular income} \end{array}$$

Therefore, the first element of project finance is to ascertain regular income by subtracting non-recurring income from total income.

Cash Expenses. Cash expenses are, as you might guess, the expenses you have to pay for in cash. The term "cash expense" is emphasized here, rather than just "expense," because the concept of "expense" has come to be a term of art in accountancy, generally meaning any sum which may rightfully be deducted from income. The term "cash

expense" is used here to differentiate that which may be deducted from that which must actually be paid. In other words, a system may have expenses which do not result in cash expenditures. The most common expense which is not actually paid in cash is depreciation. Another is amortization.

The concept of cash expenses is important because cash expenses will almost always be less than total expenses. And, as anyone who sits down with a checkbook at the end of the month knows, the fewer the expenses, the more money that is left over. It is these funds -- the money that is left over after all cash expenses are paid -- that are used to pay debt service.

Cash expenses are total expenses minus non-cash expenses, or:

$$\begin{array}{r} \text{Total expenses} \\ - \text{Non-cash expenses} \\ \hline \text{Cash expenses} \end{array}$$

Once we have ascertained both regular income and cash expenses we can easily calculate Cash Available for Debt Service. As you might guess, Cash Available for Debt Service equals regular income minus cash expenses, or:

$$\begin{array}{r} \text{Regular income} \\ - \text{Cash expenses} \\ \hline \text{Cash Available for Debt Service} \end{array}$$

Cash Available for Debt Service is a very important concept. It is imperative that anyone involved in the financing of any new project for a water or wastewater system know exactly what income can be counted on in the future to pay for the project. This is Cash Available for Debt Service.

We capitalize the first letters of the words "Cash Available for Debt Service" because it has come to be a term of art, with a very specific meaning, among credit analysts. It is not simply a group of words. It is neither a general nor a casual concept. It is a highly specific term which is defined as the remainder of only certain defined expenses subtracted from only certain defined income. Knowing which types of income can be used in calculating a project financing is critical.

Knowing, as well, the precise expenses which can be deducted from this type of income is equally critical. Together, these concepts comprise Cash Available for Debt Service, which are the only funds which can be used to pay for a new project.

Before leaving this topic, it is important to note that the funds we have defined as Cash Available for Debt Service are the only ones which may be used for calculating or estimating project costs and payments. When it actually comes to making a payment, any cash which the system has on hand, and which is not legally barred from being used for such purpose, may be used for making debt service payments. In other words, if a system has connection fees on hand, and is not legally barred from disbursing those funds to make annual debt service payments, it may use such funds for that purpose. It is just that you don't use them in estimating income, because they are not a regular source of income from year to year.

Knowing what funds can be used to pay for a new water or wastewater project is the first major step involved in analyzing a total project financing. Now that we know what funds can be used to pay for a project, the next question, which will be addressed in the succeeding chapter, is: what is a project payment?

Chapter 2

Annual Debt Service Payments

The preceding chapter dealt with the concept of "cash available for debt service." This is the specific term used to identify that portion of a water or wastewater system's net income which can be used to estimate, and pay for, project payments. Such project payments, on an annual basis, are usually called "annual debt service" or "annual debt service payments." This chapter will deal with the concept of "debt service" itself. As you will see, the notion of debt service can mean considerably more than the simple principal and interest normally involved in a loan transaction.

There are three components of "annual debt service payments": principal, interest and fees.

Fees.

Fees are not as easy to discuss as they might seem. This is because there are many types of fees. There are one-time only fees. There are annual fees which are expressed in flat dollar amounts, like \$250 a year. And, there are fees which are expressed as a percentage of the outstanding principal balance of the loan.

You cannot simply add up these different kinds of fees. Here you get into the old apples and oranges problem again. The only way to deal with this problem is either to convert the one-time fees and the flat dollar fees into numbers which are based on outstanding balance, or to convert

both types of annual fees into numbers which are the equivalent of one-time fees.

All of this seems complicated. And it is a bit complicated. But it is also important. Converting one-time fees to annual, and vice versa, will be dealt with in Chapter 5. Actually identifying and quantifying these fees will be covered in Chapter 11.

Interest.

The interest component of annual debt service is the simplest and most straightforward subject to explain and calculate. No matter what type of loan you are dealing with, and no matter how long the term of the loan is, the amount of interest due and payable in any year is calculated by simply multiplying the outstanding principal balance of the loan at that time by the rate of interest. Thus, if, in year x of a loan, the outstanding principal balance at that time is, say, \$63,000, and the interest rate on the loan is 7%, then the next annual debt service payment will contain an interest component of \$4,410, which is equal to \$63,000 $\times$.07.

That is all there is to say about interest.

The problem, as you might guess, is: how to figure out what the outstanding principal balance is in year x ? This leads us to the discussion of principal, which is by far the most complicated aspect of dealing with annual debt service payments.

Principal.

We will begin with a definition of principal and a discussion of the several ways in which principal can be repaid.

The best definition of principal is that it is the amount of money which, with interest, your system must pay for its project.

You may think this is a querulous definition. After all, couldn't principal also be defined as the amount you borrow? Or, couldn't it also be defined as the total project cost? The answer to both of these questions is yes, most of the time, but not always. The definition which is true all of the time is that it is the amount of money which you must pay, with interest, for your project.

If you are now beginning to suspect that you may sometimes wind up paying back more than you borrowed, you are right. This actually happens, sometimes.

There are generally three ways in which principal is paid. They are: the level payment method, the level principal method, and a method in which nothing is level, which we will call the irregular method.

To emphasize the fact that the phrases Level Payment Method and Level Principal Payment Method are terms of art, with very specific meanings, we will henceforth capitalize the initial letters of these terms. We will not so dignify the irregular method, however, precisely because it is irregular, and is not a term of art.

The Level Payment Method is, by far, the most common and the most popular. Virtually all home mortgages are calculated on the Level Payment Method. We will look at this method first.

THE LEVEL PAYMENT METHOD

As you would clearly imagine from its title, the Level Payment Method means that the total amount of principal and interest, combined, which you pay every year is the same. In other words, it is where your principal and interest payments each year might be, for example, \$75,000. The key point here is that the payment is exactly the same year in and year out.

Why is the Level Payment Method the most popular formula for making project payments? There are three reasons. First, it is almost always the cheapest. Second, it greatly facilitates planning. And, last but by no means least, it is the fairest. Let us examine these principles.

The first is the concept of how the Level Payment Method results in the cheapest means of financing a project. This principle involves an understanding of "discounting" or the "time/value theory of money." These topics are covered in Chapter 3 below, as is a thorough illustration of how the Level Payment Method can (and usually does) result in the lowest overall cost to ratepayers.

The second principle is that the Level Payment Method greatly facilitates fiscal planning for the system. You will recall a few paragraphs ago we said that debt service payments had three components: principal, interest and fees. As such, the first two, principal and interest, comprise the great majority of the payment. Fees are generally small in relation to principal and interest, combined. Therefore, if principal and interest, combined, comprise the great majority of the payment, and if

principal and interest, combined, are always the same from year to year, then the fiscal planning of the system is greatly simplified.

Needless to say, implicit in this facilitation of the financial planning process is the notion that the Level Payment Method will also greatly facilitate the ratepayer relation process. As bad as it is to have to explain to ratepayers why their water or sewer payments must increase to pay for a new project, it would be far worse to have to do this every year, as would be the case if their rates were bobbing up and down as their annual debt service payments fluctuated from year to year.

This leads us to the third principle which is that the Level Payment Method is the fairest.

The payments for a project should, as far as is practicable, be spread over the same period of years in which the project will be used by the system. This principle is more fully discussed below in Chapter 9. As such, each ratepayer will pay his equitable share of the cost of the project.

Let us consider a project, the annual debt service payment on which is \$75,000 per year for forty years. Let us also say that the project involves improvements to the system which will last forty years, at least. Finally, let us say that there are 1,000 users and that each pays pro rata. So each ratepayer will pay \$75 per year for forty years.

In such circumstances, let us take the example of a ratepayer who sells his home after one year and moves out of the district. The ratepayer, as one of 1,000 users, gets 1/1,000th of the benefit of the project per year. Since the project (and the payments therefor) will last 40 years, each year he will actually get 1/40th of 1/1,000th of the benefit, or 1/40,000th of the benefit. By the time he moves out of the district at the end of the first year, he will have had the benefit of 1/40,000th of the project and he will have paid \$75, which is exactly 1/40,000th of the total project cost. (Total project cost is 40 years x \$75,000 or \$3,000,000. $1/40,000 \times \$3,000,000$ equals \$75.)

This same process can be applied with the same results to someone who buys a home in the district and becomes a ratepayer in the 39th year of the project. He pays his fair share, just like the fellow who moved out after one year. The process also applies with the same inherently fair results to one who is a ratepayer for the full forty years. It is also true whether the district expands or contracts with fewer or more ratepayers from one year to the next.

In short, the Level Payment Method means that every ratepayer will pay his proportional share of the project cost regardless of how many years he enjoys the benefits of the project.

ILLUSTRATION OF LEVEL PAYMENT METHOD

As you know, the amount of interest you pay on any loan of any kind in a given year is directly proportional to the outstanding principal balance on the loan. Let us say you borrowed \$200 from a friend and agreed to pay him back \$100 plus 10% interest at the end of the first year and \$100 plus 10% interest at the end of the second year. At the end of the first year, you would pay your friend interest of \$20, which is 10% of \$200. You would also pay \$100 of principal. Thus, at the beginning of the second year, the outstanding balance on the loan is only \$100. So, at the end of the second year you only pay \$10 interest, which is 10% of \$100. In other words, you only pay interest on the amount of money you owe; so as you pay off the loan, the amount of interest you must pay each year gets smaller.

Now, consider this: If the amount of interest declines each time a principal payment is made, how can any series of loan payments be constant? The answer is very simple. As the amount of interest declines with every payment that is made, the amount of principal increases by the same amount.

We all know intuitively that every loan payment is composed of principal and interest. Another way of saying this is that Principal (P) plus Interest (I) equals the Annual Payment (AP). The arithmetic expression for this sentence is:

$$P + I = AP$$

Now, as we said before, the Level Payment Method means, by definition, that all Annual Payments are equal. To thoroughly understand what is going on here, let us look at an Annual Payment schedule for a 5-year loan of \$100,000 at an interest rate of 10%, as shown in Table 2-A, on top of next page.

Table 2-A

Year	Principal	+	Interest	=	Annual Payment
1	\$16,380	+	\$10,000	=	\$26,380
2	18,018	+	8,362	=	"
3	19,820	+	6,560	=	"
4	21,802	+	4,578	=	"
5	<u>23,980</u>	+	2,400	=	"
	\$100,000				

Please notice, before anything else, that all of the Annual Payments are the same. Please also note that as the amount of Interest decreases each year, the amount of Principal increases by exactly the same amount. Figure 2-A, below, shows this relationship in graphic form.

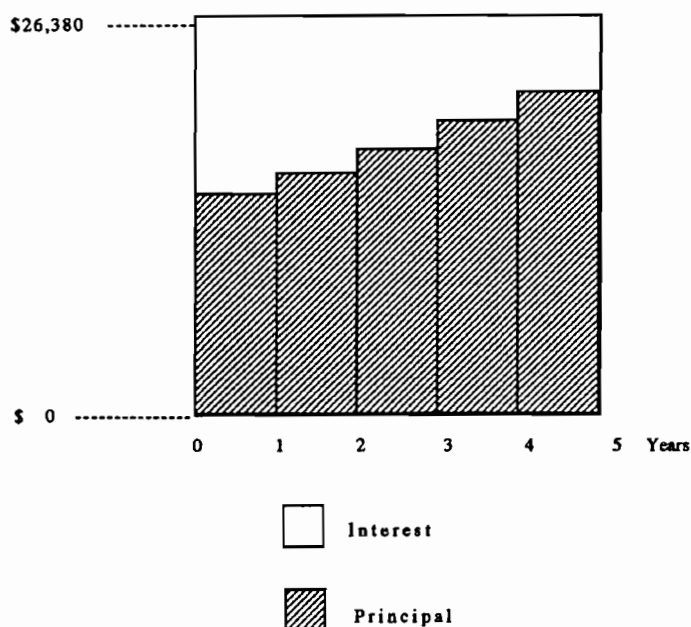


Figure 2-A (graph of Table 2-A)

The importance of the Level Payment Method is that the Annual Payment is always the same from year to year. This is achieved by

increasing the Principal by the precise amount of the decrease in the Interest.

Now, the only other number which ought to ring a bell in the above example is the first year's Interest (\$10,000). The reason this should look familiar is that it clearly represents 10% Interest on the first year's Principal of \$100,000.

If you look carefully again at Year 1, there should be two things which bother you. How do we know the Annual Payment is \$26,380? And, how do we know the first Principal payment is \$16,380?

The answer to the first question is that we calculate the Annual Payment by using a formula. If you would like to see the formula and how it works, please turn to the section in Chapter 9, entitled "Calculating Annual Debt Service Payments for Loans Using the Level Payment Method."

(The equation in Chapter 9 is the same one which is used for calculating the monthly payments on a home mortgage. If you have a calculator, you can calculate your monthly mortgage payment by making only four keystrokes. These are listed in Appendix B. If you do not have a calculator and if you had a thirty-year mortgage, you would have to make over 360 [12 months x 30 years = 360 payments] individual calculations!)

For those unaccustomed to working with calculators, a table of Annual Payments for various bond terms and at various interest rates has been included in Appendix C.

CALCULATING ANNUAL PRINCIPAL AND INTEREST PAYMENTS: THE ANNUAL DEBT SERVICE PAYMENT SCHEDULE

Once you know the Annual Payment, calculating the amount of the first year's Principal payment is quite easy. You simply subtract the Interest (\$10,000) from the Annual Payment (\$26,380), as follows:

$$\$26,380 - \$10,000 = \$16,380$$

Now, once you have calculated the first year's Principal payment, you can easily calculate all of the other Interest and Principal payments. This is possible because the Annual Payment is always the same.

For example, what are the second year's Interest and Principal payments? We can figure this out by simple logic.

We know that the original Principal amount was \$100,000, and we know that in the first year we paid off \$16,380 of Principal. So, at the beginning of the second year, the following amount of Principal was outstanding:

$$\$100,000 - \$16,380 = \$83,620$$

Now that we know how much Principal is outstanding, we can easily find the second year's Interest by taking 10% of that number, as follows:

$$\$83,620 \times .1 = \$8,362$$

To calculate the amount of Principal paid in the second year, we use the same procedure used in the first year, viz., we subtract the Interest payment (\$8,360) from the Annual Payment (\$26,380), as follows:

$$\$26,380 - \$8,362 = \$18,018$$

To obtain the Principal balance at the beginning of the third year, we repeat the process by subtracting the second year's Principal payment (\$18,018) from the outstanding Principal balance at the end of the first year (\$83,620), as follows:

$$\$83,620 - \$18,018 = \$65,602$$

You can repeat these procedures each year to obtain the precise Interest and Principal payments as well as the outstanding principal balances for each year of the loan.

Here, in Table 2-B on the next page, is an annual debt service payment schedule for the five year loan in our example using the Level Payment Method:

(N.B. The information contained in the following Table usually appears on an "amortization schedule." Technically speaking, an amortization schedule is only a list of the principal amounts to be repaid in each year of a loan term. See Chapter 9. To preserve this distinction, we will refer to the more complete types of schedules, such as that in Table 2-B, below, as annual debt service payment schedules.)

Table 2-B Annual Debt Service Payment Schedule, Level Payment Method
(Loan: \$100,000, 5 years, 10% interest)

Year	Annual Payment	Interest	Principal	Outstanding Principal Balance
1	\$26,380	\$10,000	\$16,380	\$83,620
2	"	8,362	18,018	65,602
3	"	6,560	19,820	45,782
4	"	4,578	21,802	23,980
5	"	2,400	<u>23,980</u>	0
			\$100,000	

Please note once again, with the Level Payment Method:

- 1.) The Annual Payments are always the same. This is the definition of the Level Payment Method.
- 2.) The amount of Principal paid each year increases by the exact amount in which the Interest payment decreases.
- 3.) The total of all of the annual Principal payments equals the original Principal amount of the loan.

RULES FOR CREATING ANNUAL DEBT SERVICE PAYMENT SCHEDULES FOR THE LEVEL PAYMENT METHOD

Even with a hand-held calculator, creating an annual debt service payment schedule requires listing all of the elements for each year. Here are the rules for creating such schedules without the use of a calculator: (Please note that we are assuming a loan in which Principal payments are made annually. If Principal payments are made more frequently, such

as semi-annually, quarterly, or monthly, then the calculations described in steps 4, 5, and 6 will have to be performed for each Principal payment.)

- 1.) Once you know the Principal amount of the loan and the rate of Interest, determine the Annual Payment by either using the instructions in Appendix B, or by looking it up on the table and performing the simple calculation as described in Appendix C.
- 2.) Calculate the first year's Interest payment by multiplying the original Principal amount by the rate of Interest.
- 3.) Obtain the first year's annual Principal payment by subtracting the first year's annual Interest payment from the Annual Payment.
- 4.) Obtain the outstanding Principal balance for the next year by subtracting the first year's annual Principal payment from the original Principal amount of the loan.
- 5.) Obtain the next year's annual Interest payment, by multiplying the preceding year's outstanding Principal balance by the rate of Interest.
- 6.) Obtain the next year's annual Principal payment by subtracting that year's annual Interest payment from the Annual Payment.
- 7.) Obtain the next year's outstanding Principal balance by subtracting that year's annual Principal payment from the preceding year's outstanding Principal balance.
- 8.) Repeat steps 5, 6, and 7, for each year of the loan.

As you can see, if you have a forty-year loan, you have your work cut out for you. And, if you have a thirty-year mortgage and would like to create an annual debt service payment schedule for your home, you really have your work cut out for you, because you must do each of the calculations for each month. Since there are three steps required for each payment and since there are 360 monthly payments on a thirty-year loan, you will have 1,080 calculations! Now, you know why your banker didn't create your home mortgage payment schedule while you

were sitting there in his office. You also know why computers are so popular among financial people.

THE LEVEL PRINCIPAL PAYMENT METHOD

Now that you know that the Level Payment Method means that the Annual Payments are always the same, you might correctly assume that with the Level Principal Payment Method, the annual Principal payments are always the same. There is an important corollary to this assumption.

With the Level Payment Method, the Annual Payment is a constant and both the Interest payment and the Principal vary each year.

In the Level Principal Payment Method, the annual Principal payment is a constant and both the Annual Payment and the annual Interest payment vary each year.

We can begin to examine the Level Principal Payment Method by first ascertaining what, in fact, the level Principal payments will be for each year of the loan. We do this simply by dividing the original Principal amount of the loan (\$100,000), by the number of years in the term of the loan (5), or $\$100,000 / 5 = \$20,000$. We now know that we will pay off \$20,000 of Principal in each year of the loan.

Here, in Table 2-C below, are the annual Principal payments for the five-year loan of \$100,000 at 10% in our example:

Table 2-C

Year	Principal Payment
1	\$20,000
2	20,000
3	20,000
4	20,000
5	<u>20,000</u>
	\$100,000

Please note, above all, that the annual Principal payments equal the original Principal amount of the loan.

Next, referring back to our corollary, we must realize that if the annual Principal payments are constant, then both the Annual Payment and the annual Interest payment will vary from year to year. Let us see.

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In the first year, all \$100,000 of the original loan Principal is outstanding, so we can calculate the first year's annual interest payment by multiplying the original Principal balance (\$100,000) by the rate of Interest (10%, or .1), as follows:

$$\$100,000 \times .1 = \$10,000$$

Now that we have both the first annual Interest payment (\$10,000) and the level Principal payment (\$20,000), we can readily see that the first Annual Payment is \$30,000.

$$\$10,000 + \$20,000 = \$30,000$$

Thus, we now have both the first year's Interest payment (\$10,000), the level Principal payment (\$20,000), which is not only paid in the first year but in every year of the loan, as well as the first year's Annual Payment which is the sum of the two, or \$30,000. Now, to calculate the succeeding years' Annual Payments and annual Interest payments.

In order to do so, we must first calculate the outstanding Principal balance at the end of the first year. This is done by subtracting the level Principal payment (\$20,000) from the original Principal balance (\$100,000), as follows:

$$\$100,000 - \$20,000 = \$80,000$$

With the outstanding Principal balance at the end of the first year, we can now calculate the annual Interest payment and the Annual Payment for the next year. The annual Interest payment for the second year is obtained by multiplying the outstanding Principal balance (\$80,000) by the rate of interest (10%, or .1), as follows:

$$\$80,000 \times .1 = \$8,000$$

With the second year's annual Interest payment (\$8,000) we can now calculate the second year's Annual Payment by adding it to the level Principal payment (\$20,000), as follows:

$$\$20,000 + \$8,000 = \$28,000$$

Notice that the second year's Annual Payment is lower than the first year's Annual Payment.

By repeating the above process for every year of the loan term, we can construct an annual debt service payment schedule for our five-year loan based on the Level Principal Payment Method, as is shown in Table 2-D, below.

Table 2-D Annual Debt Service Payment Schedule, Level Principal Payment Method (Loan: \$100,000, 5 years, 10% interest)

Year	Annual Payment	Interest	Principal	Outstanding Principal Balance
1	\$30,000	\$10,000	\$20,000	\$80,000
2	28,000	8,000	"	60,000
3	26,000	6,000	"	40,000
4	24,000	4,000	"	20,000
5	22,000	2,000	"	0
			<u>\$100,000</u>	

Please note that with the Level Principal Payment Method:

- 1.) The annual Principal payments are the same in each year. This is the definition of the Level Principal Payment Method.
- 2.) Both the annual Interest payment and the Annual Payment decrease each year.
- 3.) The total of all of the annual Principal payments, of course, equals the original Principal amount of the loan.

RULES FOR CREATING ANNUAL DEBT SERVICE PAYMENT SCHEDULES FOR THE LEVEL PRINCIPAL PAYMENT METHOD

Creating an annual debt service payment schedule with the Level Principal Payment Method does not involve an elaborate equation or a table. It can be done with the aid of a simple adding machine or just a pencil and paper.

- 1.) Once you know the original Principal amount of the loan and the number of years in the term, you can calculate the level Principal payment, which will be the annual Principal payment for each year of the loan, by dividing the original Principal amount by the number of years in the term of the loan.
- 2.) Calculate the first year's annual Interest payment by multiplying the original Principal amount of the loan by the rate of interest.
- 3.) Obtain the first year's Annual Payment by adding the level Principal payment to the first year's annual Interest payment.
- 4.) Obtain the outstanding Principal balance at the end of the first year by subtracting the first year's level Principal payment from the original Principal amount of the loan.
- 5.) Calculate the next year's annual Interest payment by multiplying the outstanding Principal balance from the preceding year by the rate of Interest.
- 6.) Calculate the next year's Annual Payment by adding that year's annual Interest payment to the level Principal payment.
- 7.) Calculate the next year's outstanding Principal balance by subtracting the current year's level Principal payment from the preceding year's outstanding Principal balance.
- 8.) Repeat steps 5, 6, and 7, for each year of the loan term.

THE IRREGULAR METHOD

Unlike both the Level Payment Method and the Level Principal Payment Method, which have at least one constant, the irregular method of debt service payment has none. As its name suggests, it is totally irregular. Before looking at the irregular method, it will be worthwhile to explore the circumstances in which it is most often used.

The irregular method of payment is used, in short, when neither the Level Payment Method nor the Level Principal Payment Method will do for factual reasons.

There are actually very few sets of circumstances which come to mind where the irregular method might be preferable.

The first might be where a system issued a bond or obtained a loan prior to the construction of the project.

In such case the project might require two years or more to complete, and the system's board might not want (or might not be permitted) to begin charging the users for the project until it was on line and the benefits of the project were available to all of the ratepayers.

In such case, you would most likely see a payment schedule which provided for no principal payments at all for the first three years. During this time, the bondholders or the bank would only receive interest on the bond or loan.

As you know from the preceding paragraphs, however, in the first few years of the loan, interest payments can be substantial. Using the level payment method, interest makes up the great majority of the Annual Payment in the first several years of the loan. Thus, if the goal of the board of directors is to minimize the cost to the ratepayers prior to the actual operation of the project, then, in most circumstances, not only will the directors elect not to have any principal payments in the first three years, but they will also elect not to have any interest payments during that period, as well!

How so? Wouldn't we all like to elect not to make either principal or interest payments on our loans? Yes, of course, we would; it is just that average citizens are seldom given the opportunity to make such an election. Water districts, on the other hand, may have this luxury. It all depends on the financial history of the district and the current status of its funds. Financially strong systems will be offered the opportunity to defer such payments. Weak systems will not.

How is it done? Well, of course, if the system had issued a bond, the bondholders would still get their interest payments every six months.

Interest would actually be paid by the system. Yes, but from what funds? The answer is: from borrowed funds.

In short, a system which borrows in advance of charging its users will have to get the money to pay interest to the bondholders, during such time, from somewhere. That "somewhere" is the bond itself. In other words, the system must borrow more than it needs for the project. In fact, it overborrows the precise amount it needs to make up for the missing user fees.

Suffice it to say that when a system elects to defer principal payments, it will have an irregular payment schedule. If it elects to defer both principal and interest payments, it will not only have an irregular payment schedule but it will have an inflated total project cost, as well. The problem of inflated project costs will be dealt with in Chapter 14 below. The irregular payment schedule will be dealt with here.

Let us assume that a system issued a \$1,000,000 bond for a forty-year term at an 8% rate, with no principal payments for the first three years. Assume, as well, that in year four, principal begins to be amortized according to the Level Payment Method. As such, the first ten years of the annual debt service payment schedule would be as presented, below, on Table 2-E.

Table 2-E

Year	Interest	Principal	Annual Payment
1	\$80,000	\$ 0	\$ 80,000
2	"	"	"
3	"	"	"
4	"	4,900	84,900
5	79,608	5,292	"
6	79,185	5,715	"
7	78,727	6,173	"
8	78,234	6,666	"
9	77,700	7,200	"
10	77,124	7,776	"

As you can see, with the irregular method neither the Interest, nor the Principal, nor the Annual Payment remain constant over the entire term of the bond. As you can also tell by simple visual inspection, there is very little to be gained by this method. The difference between the first

three years' payments and the remaining payments is only a little over 6%.

I want to point out that it would not be correct to compare the annual debt service payment schedule presented above with an annual debt service payment schedule for a bond of identical tenor but which uses either the Level Payment Method or the Level Principal Payment Method. This is because, for the reasons discussed above, in order to defer both Interest and Principal, a system would have to increase the amount it had to borrow. Thus in a fair comparison, both the Level Payment Bond and the Level Principal Payment Bond would be for \$1,000,000, but the comparable irregular method bond would be for more than \$1,000,000.

Another circumstance which might warrant the use of the irregular method is where a system might have a realistic expectation of future income. By "realistic expectation," I mean such circumstances as where a system is extending its lines to a group of existing homes which, for one reason or another, must connect to the system. I specifically do not mean the circumstance whereby a system builds lines out into unoccupied land and then prays that someone will buy a lot, build a home on it, and eventually connect to the system.

The additional income from the annual service charges -- not the non-recurring connection fees -- for the real, additional users can be calculated precisely using today's rates. A reliable schedule of when that additional income can be expected to reach the system's coffers can also be developed. It seems not only reasonable but laudable that the system would opt for the irregular method under these circumstances. After all, if it did not, the system would find itself in a few years with an excess of income (from the additional user fees) and its directors would be open to the charge of fiscal mismanagement.

This what might be termed "impending additional income" situation could just as easily arise from other types of circumstances. For example, a system may be planning to sell some of its property. It will certainly be able to reasonably estimate the amount of gain it will have from the sale and determine that at least a portion of that gain will be set aside to pay off loan principal. This would warrant using the irregular payment method with principal payments skewed to those years immediately after the planned sale date of the property.

The final circumstance which might also warrant the use of an irregular payment method, arises not from within the system, but from without the system. It actually arises from within the bond market.

In such circumstances, there are simply an inordinately large number of buyers willing to buy bonds of certain terms (e.g., five years, or ten years) but not other terms (e.g., six years, or nine years). Because there are a large number of buyers, the interest rates at these maturities should be very favorable to the water system which is borrowing. (Please see discussion of Rates vs. Maturities in Chapter 10, below.) In such case, a water system's financial advisor or investment banker might well recommend an annual debt service payment schedule with Principal payments skewed to those favorable maturities to take advantage of the more favorable rates.

In summary, there are certain factual situations which might warrant the use of the irregular payment method. If this method is recommended to you, you can construct an annual debt service payment schedule, albeit you must do so manually.

RULES FOR CREATING ANNUAL DEBT SERVICE PAYMENT SCHEDULES USING THE IRREGULAR METHOD

Creating an annual debt service payment schedule for the irregular method must be done manually. As you know, with the irregular method the annual Principal payments are given, literally. This means that either your financial advisor or investment banker will give you a schedule with the proposed Principal payments for each year. In some cases (where they are targeting certain maturities to get better rates), they will also give you the Interest rate for each particular maturity. This is where the calculation gets a little complicated. The reason for this is that you must actually make up a mini-schedule for each maturity, and then add all of them together. This is not as onerous as it sounds because each of the maturities has only one Principal payment; and, therefore, all of the interest payments in the intervening years are the same. In short, the mini-schedule for each of the maturities actually looks like a small bond with only one Principal payment. Let us look at an example.

Let us take the case of a loan or small bond issued for only seven years to purchase some machinery and equipment for your water or wastewater system. The bond is for \$1,000,000 and your financial advisor recommends paying off 40%, or \$400,000 at the end of the fifth year and the balance, 60% or \$600,000, at the end of the seventh year. He makes this recommendation because he believes the five-year maturity will carry an Interest rate of 6% and the seven-year maturity will carry an Interest rate of 8%.

As indicated before, to create an annual debt service payment schedule for the whole bond we must first create mini-schedules for each of the maturities, and then add them together. Here, in Table 2-F below, is a schedule for the year five maturity at an Interest rate of 6%:

Table 2-F

Year	Interest	Principal	Annual Payment
1	\$24,000	\$ 0	\$ 24,000
2	"	"	"
3	"	"	"
4	"	"	"
5	"	\$400,000	\$424,000

Now, here, in Table 2-G below, is the schedule for the final maturity in year seven at an Interest rate of 8%:

Table 2-G

Year	Interest	Principal	Annual Payment
1	\$48,000	\$ 0	\$ 48,000
2	"	"	"
3	"	"	"
4	"	"	"
5	"	"	"
6	"	"	"
7	"	\$600,000	\$648,000

Now we can complete the annual debt service payment schedule for the whole bond by adding together the two schedules above, as shown on top of the next page in Table 2-H:

Table 2-H

Year	Interest	Principal	Annual Payment
1	\$72,000	\$ 0	\$ 72,000
2	"	"	"
3	"	"	"
4	"	"	"
5	"	400,000	472,000
6	48,000	0	48,000
7	"	\$600,000	\$648,000

That is what an annual debt service payment schedule looks like when the irregular payment method is used. It is not pretty; but, at least, it is not difficult to create.

Now, before moving on, there are two minor points which need to be made.

Going back to our example, above, let us assume for the moment that your financial advisor is right, that you are able to get these rates, and that you are satisfied you are saving your system some money; there is still one thing which should be bothering you.

Look at the payment schedule. How do you think your ratepayers will react in year five when their rates are adjusted to accommodate a 656% increase (from \$72,000 to \$472,000) in annual debt service payments? Or, even better, how will they feel the following year, when they are adjusted again to accommodate a 90% decrease (from \$472,000 to \$48,000) in annual debt service payments?

The answer to this is obvious. The ratepayers would be furious. You and your fellow members of the system's management would undoubtedly find yourselves unflatteringly, but prominently, displayed on the front pages of the local newspaper.

You do not have to put your ratepayers through the agony of such a teeter-totter payment schedule. You do not have to collect the precise amount of annual debt service payments due each year from the ratepayers. You can collect any reasonable amount; and, under the circumstances, one of the more reasonable amounts to collect would certainly be the average of all the payments.

Place a piece of paper below the Annual Payment column in the final annual debt service payment schedule and add them up. They will total \$1,456,000. Then divide by the number of years of the bond (7), to get the average of \$208,000. If you collected \$208,000 each year from your

ratepayers, there would be no shock from radically changing rates, and you would certainly have sufficient funds to make all of the Annual Payments.

If you did, however, collect the \$208,000 each year from your ratepayers, you would be collecting too much.

In year one you would collect \$208,000 but would only pay out \$72,000. At the end of the year you would have a balance of \$136,000 which you would not need for several years. You would, of course, invest those funds. You would do the same thing every year, and at the end of the bond term in year seven, you would have a sizeable sum remaining after all of the bonds were paid off. This amount would constitute an overcollection from your ratepayers.

Now you may be able to brush such a matter under the rug, especially if it is small. But more than likely you will be open to the charge of fiscal mismanagement for not taking into account at least some investment earnings before you determined how much the ratepayers had to pay each year for the project.

A conservative and highly acceptable way of estimating these investment earnings is to assume that the funds will be invested from the date of receipt until they need to be disbursed. A conservative interest rate should also be used to estimate earnings. In this regard, assuming you are in a stable and otherwise normal interest rate environment, it is always prudent to use a rate slightly lower than the prevailing rate in making your estimates. In Chapter 4, we will discuss the pitfalls of choosing the wrong interest rate to estimate savings. Suffice it to say here that a rate slightly lower from the prevailing rate will save you from appearing in the headlines again -- this time for causing a default on your system's loan because you over-estimated your interest income.

In summary, with the irregular method, annual debt service payment schedules are created manually from information provided by your financial advisor or investment banker concerning the annual Principal payments and the Interest rates at various maturities over the term of the loan. Here are the simple rules:

- 1.) Obtain the annual Principal payments and the Interest rates applicable thereto for each maturity from the system's financial advisor or investment banker.
- 2.) For a particular maturity, calculate each of the annual Interest payments for each maturity by multiplying the amount of

Principal to be paid at that maturity by the rate of Interest applicable to that maturity.

- 3.) For the same maturity, calculate each of the Annual Payments by adding the annual Interest payment to the annual Principal payment, if any, for each year.
- 4.) Repeat steps 2 and 3, creating a schedule for each maturity.
- 5.) Add all of the schedules for all of the maturities.

There are times when using the irregular method can be very advisable for a water or wastewater district. As with any method, or with any financial program or technique, the real question is whether it is the most cost effective means of financing the project for the ratepayers. If it is, good. If it is not, there should be an extremely compelling argument as to why any method which is not the most cost effective should be used.

Chapter 3

Evaluating Annual Project Payments

This chapter deals with the problem of dollars which are paid or earned in different years.

The problem arises because the value of money changes over time.

More specifically, a dollar to be paid in twenty years is not the same as a dollar which must be paid today, or next year, or in any other year.

We can illustrate this point with a brief example.

Let us say your water system needs to finance a project and receives two offers:

Offer A requires the system to pay \$190,000 for ten years.

Offer B requires the system to pay \$100,000 for twenty years.

Which is less expensive for your system?

(There are important considerations as to whether you should make your decision on an annual or total cost basis. These matters will be discussed in Chapters 6 and 7, below. For now, however, we will consider only the total cost basis.)

The natural approach to the problem would seem to add up the total payments and see which is cheaper.

Offer A requires 10 payments of \$190,000 each, or \$1,900,000 ($10 \times 190,000 = 1,900,000$).

Offer B requires 20 payments of \$100,000 each, or \$2,000,000 ($20 \times 100,000 = 2,000,000$).

One would, therefore, conclude, by subtracting the sum of the payments in Offer A from the sum of the payments in Offer B ($2,000,000 - 1,900,000 = 100,000$), that Offer A is cheaper by \$100,000.

The one who reached this conclusion, however, would be wrong.

Offer A is not \$100,000 cheaper. Offer B is cheaper. And, it is \$220,907 cheaper!

The reason why Offer B is cheaper than Offer A is because the value of money changes over time. The real value of each payment is different in each year. And, the sum of the real values is the real cost.

I honestly believe that one of the major reasons why many people think that finance is black magic is that they fundamentally do not believe that the value of a dollar changes over time.

In the last ten years I have taught what is called the "time/value theory of money" to somewhere between twenty-five hundred and three thousand students. Of these, I would estimate that between twenty and twenty-five percent did not believe that the dollar changed value over time and would not be convinced of it. And, another forty to fifty percent probably had at least some doubts.

I strongly suspect that one of the major reasons for this almost endemic phenomenon lies in the childish simple notion that the actual dollars, i.e., the bills themselves, change very little over time.

As a matter of fact, as far as the notes themselves are concerned, apart from the changes of the names of the Treasurer of the United States and the Secretary of the Treasury, the only other change I can think of in the last thirty-five years is that the words "silver certificate" were replaced with "federal reserve note" on the front of the one dollar bill. Other than that, the dollar has not physically changed at all. If you put a fistful of dollars in a time capsule fifty years ago, they would still look the same. Furthermore, if, your parents put the exact amount of their first mortgage payment in a tin box and buried it in the back yard on the day they bought their home thirty years ago, they would find as they dug it up thirty years later that they had enough money to make the final payment. If that is true, how could the value of the dollar have changed?

The Time/Value Theory of Money.

We must begin by pointing out that the "Time/Value Theory of Money" is not a theory at all. It is fact. Absolute fact.

The word "theory" has nothing to do with whether the value of money changes over time; rather, it has only to do with how the value of money changes over time.

Having said this, we are now going to present a series of examples to illustrate just how the value of money does change over time.

The first, and perhaps, most familiar is the savings account.

The second deals with a U.S. Savings Bond and how the surrender value is calculated. The third and fourth examples are more abstruse.

The third deals with changes in the price of milk and how that relates to the change in the value of money over time.

The fourth example uses a thirty-year, fixed-rate mortgage to show the subtle changes which are actually occurring when neither the home nor the payment appear to change at all over the thirty-year period. Next, we will do some actual illustrations of how the change in the value of money over time relates to the payments a water or wastewater system makes on behalf of its projects. And, last, the chapter will end with the solution to the problem posed at the beginning of the chapter: how twenty years of \$100,000 payments can actually be cheaper than ten years of \$190,000 payments.

Now, for the first example, the savings account.

Let us say that you have \$1,000 which you want to put into a safe investment account to have for your retirement in twenty years. Let us say your local bank will offer you a guaranteed rate of 5%, compounded annually. How much money will you have in twenty years?

Before we calculate the answer, we have to get clear on some terminology to avoid confusion later on.

Present Value and Future Value.

In our example, the \$1,000 you have today is called the Present Value.

The amount of money you will have in twenty years is called the Future Value.

Please note that the terms Present Value and Future Value are relative terms. They have nothing to do with today's calendar. The best rule to follow is that when you have two sums of money separated by time the Present Value is the earlier amount and the Future Value is the later amount.

Discounting and Compounding.

The process of going from Present Value to Future Value is called Compounding. This is the process by which the value of money increases over time.

The process of going from Future Value to Present Value is called Discounting. This is the process by which a known sum of money in the future can be reduced to today's terms.

As you can readily see, Discounting is the opposite of Compounding.

The Interest Rate is the factor by which you either Compound a Present Value to reach a Future Value, or the factor by which you Discount a Future Value to reach a Present Value. Thus, when going forward from Present to Future Values, it is called a Compounding Rate; and, when going backwards from Future to Present Values, it is called a Discount Rate.

The Period is the number of times you either Compound a Present Value to reach a Future Value or the number of times you Discount a Future Value to reach a Present Value. In most instances, you will be told what the Compounding or Discounting Period is. For example, in our problem above, we said that our \$1,000 would Compound annually. For twenty years, this means that we would Compound twenty times.

In loan transactions, the Period is the number of times a Principal payment will be made. For example, most home mortgages have monthly Principal payments. This means that for a thirty-year home mortgage with monthly payments, there would be 360 Periods (30 years x 12 months per year = 360 Periods).

Most large loans, such as those made to water or wastewater systems, have annual Principal payments. So, this book will assume annual **Compounding or Discounting**, unless specifically noted otherwise.

Please be sure to note as well that the term Period refers to Principal payments only. It is common that Interest payments may be made more frequently during the year. For example, Interest is often paid quarterly or semi-annually, while Principal is only paid annually.

CALCULATING FUTURE VALUES

Now, here are the procedures for compounding or calculating Future Values:

To Calculate Future Values (Compounding)

- 1.) Convert the Interest Rate, or Compounding Rate (e.g., 5%), to a decimal (e.g., .05) and add the number 1 ($1 + .05 = 1.05$). We will call this number the Compounding Factor.

- 2.) Multiply the Present Value (e.g., \$1,000) by the Compounding Factor as many times as there are Periods (e.g., 20). The result will be the Future Value.

Here is what the calculation of the Future Value of your \$1,000 retirement account would look like, Figure 3-A.

The Future Value of your pension fund will be \$2,653.30 in twenty years.

The Present Value is \$1,000. The Compounding Rate is 5%, or .05. And, the number of Periods is 20. Thus, according to our formula, we first find the Compounding Factor by adding the number 1 to the decimal expression (.05) for the Compounding Rate (1.05). Then, we multiply the Present Value by the Compounding Factor 20 times, which is the number of Compounding Periods. The result is the Future Value.

This process is extremely important. The terminology may seem unwieldy at first, but it is worth getting used to, since it is widely used in comparing project costs not only for water and wastewater projects but for all types of financing.

CALCULATING PRESENT VALUES

Finding a Present Value, when you know the Future Value, involves precisely the opposite process.

Let us use a U.S. Savings Bond as an example. Let us say a rich aunt gives your newborn baby a \$1,000 Savings Bond as a present. Such Bonds generally mature in twenty years. For the sake of continuity, let us also say that the Savings Bond carries an Interest Rate of 5%.

Figure 3-A

\$1,000.00	
<u> x1.05 </u>	(1)
1,050.00	
<u> x1.05 </u>	(2)
1,102.50	
<u> x1.05 </u>	(3)
1,157.63	
<u> x1.05 </u>	(4)
1,215.51	
<u> x1.05 </u>	(5)
1,276.28	
<u> x1.05 </u>	(6)
1,340.10	
<u> x1.05 </u>	(7)
1,407.10	
<u> x1.05 </u>	(8)
1,477.46	
<u> x1.05 </u>	(9)
1,551.33	
<u> x1.05 </u>	(10)
1,628.89	
<u> x1.05 </u>	(11)
1,710.34	
<u> x1.05 </u>	(12)
1,795.86	
<u> x1.05 </u>	(13)
1,885.65	
<u> x1.05 </u>	(14)
1,979.93	
<u> x1.05 </u>	(15)
2,078.93	
<u> x1.05 </u>	(16)
2,182.87	
<u> x1.05 </u>	(17)
2,292.02	
<u> x1.05 </u>	(18)
2,406.62	
<u> x1.05 </u>	(19)
2,526.95	
<u> x1.05 </u>	(20)
\$2,653.30	

Figure 3-B

\$1,000.00	
<u>x.9524</u>	(1)
952.38*	
<u>x.9524</u>	(2)
907.03	
<u>x.9524</u>	(3)
863.84	
<u>x.9524</u>	(4)
822.70	
<u>x.9524</u>	(5)
783.53	
<u>x.9524</u>	(6)
746.22	
<u>x.9524</u>	(7)
710.68	
<u>x.9524</u>	(8)
676.84	
<u>x.9524</u>	(9)
644.61	
<u>x.9524</u>	(10)
613.91	
<u>x.9524</u>	(11)
584.68	
<u>x.9524</u>	(12)
556.84	
<u>x.9524</u>	(13)
530.32	
<u>x.9524</u>	(14)
505.07	
<u>x.9524</u>	(15)
481.02	
<u>x.9524</u>	(16)
458.11	
<u>x.9524</u>	(17)
436.30	
<u>x.9524</u>	(18)
415.52	
<u>x.9524</u>	(19)
395.73	
<u>x.9524</u>	(20)
\$376.89	

We are now prepared to find out just how much your rich aunt actually paid for the Savings Bond. We do so by finding how much it is worth today.

In this example, we know the Future Value (\$1,000). We know the Interest Rate (5%), which, because we are going backwards from Future to Present Values, is a Discount Rate. We also know the Discounting Period, which is 20 years.

Here is the procedure for discounting or calculating the Present Value.

To Calculate Present Values (Discounting)

- 1.) Convert the Interest Rate, or Discount Rate (e.g., 5%) to a decimal (e.g., .05) and add the number 1 ($1 + .05 = 1.05$). Next, divide this number into the number 1, to obtain the Discount Factor: ($1 / 1.05 = .9524$). Please note there is an extra step here.
- 2.) Multiply the Future Value (e.g., \$1,000) by the Discount Factor as many times as there are Periods (e.g., 20). The result will be the Present Value.

Here is what the calculation of the Present Value of the Savings Bond would look like, Figure 3-B.

The value of the 20-year, \$1,000 Savings Bond today (i.e., its Present Value) is \$376.89.

The Future Value is \$1,000. The Discount Rate is 5%, or .05. And, the number of Periods is 20. Thus, according to our formula, we first converted the Discount Rate (5%) to decimal form (.05), and added it to the number 1, to get 1.05. Then, we divided this number into the number 1, to obtain the Discount Factor (.9524). Finally, we multiplied the

Future Value by the Discount Factor 20 times, which is the number of Discounting Periods. The result is the Present Value.

The third example for us to consider concerns the changes in the price of milk.

THE TIME/VALUE OF A QUART OF MILK

I remember growing up in Buffalo, New York, almost forty years ago, when my mother would give me a quarter and watch out the window as I crossed Linwood Avenue and walked the half block to Mr. Whitcomb's Delicatessen. For my quarter, I would get not only a quart of milk, but also two penny candies, which, of course, was the reason I volunteered to go to the store in the first place.

In the last few years, since the Governor broke the dairy cartel in New York City, the price of milk has been about ninety-five cents a quart.

The milk certainly has not changed; it has not improved. The dollar bill with which I pay for the milk has not changed. What has changed is the price.

This is my point. People don't believe that the dollar has changed because it hasn't. But they do believe that prices change and that they are changing every day.

What do we really mean when we say prices change? The simple answer, in terms of milk, is that it takes more dollars to buy the same amount of milk. The quantity of the goods (milk) remains the same but the quantity of dollars changes.

But what if we were to theoretically reverse the situation? What if we keep the number of dollars constant and, instead, change the quantity of milk? For example: How many ounces of milk could you buy for twenty-three cents in 1952? How many ounces of milk can you buy for twenty-three cents in 1992? The answer in the first instance is 32 ounces and in the latter case about $7 \frac{3}{4}$ ounces. Here the number of dollars is constant and the quantity of goods which the dollar can buy changes.

This is a good example of Discounting. The change in the amount of milk is the discount. More accurately, the change in the amount of milk divided by the number of years is the average discount. Even more accurately, the discount rate equals one minus the n th root of the old milk divided by the new milk, where n is the number of years in between. Now I know you are really sorry you began reading this book.

What the above convoluted sentence is really saying is the following: By what number can I multiply the new amount of milk -- once for each year -- so that it will equal the old amount of milk?

In the context of our example, the precise question would be: By what number can I multiply 7.75oz. -- 40 times -- so that it will equal 32 ounces? The answer is 1.0361. Does this number look familiar? It should. It is the Compounding Factor. It is the number by which you multiply the original quantity (Present Value) the number of times in the Compounding Period (40 years) to reach the Future Value (32 ounces).

(N.B.: Please note that in this example the Present Value is the value in 1952 and the Future Value is in 1992. This illustrates the principle that the concepts of Present Value and Future Value are relative to any given example and have absolutely nothing to do with today's calendar.)

Now, to continue, we subtract the 1 (since that represents the original quantity [7.75 ounces] itself) and make a percentage out of the remainder: $.0361 = 3.61\%$. That is the annual rate at which the amount of milk changed. That is the Compounding Rate.

By now, you undoubtedly feel some unease talking about an "annual rate at which the amount of milk changed." This is not a natural way to describe things. Amounts of milk don't change. The containers do not get smaller. What actually changes is the price. It is much easier to visualize the change in the amount of something like milk, but it is far more commonplace to talk about change in price than the change in the amount of a commodity.

In terms of price or dollars, the math is the same except we must reverse the time sequence. (When price is constant, the old quantity is large and the new quantity small. When quantity is constant, the old price is small and the new price is large.)

In other words, the proper question would now be: By what number would I multiply 23 cents -- 40 times -- so that it would equal 95 cents? Not surprisingly, the answer is again 1.0361, or 3.61%.

The number 1.0361 is the Compounding Factor. The number 3.61% is the Compounding Rate. They are called the Compounding Factor and the Compounding Rate because we are going from a Present Value to a Future Value. The earlier amount is the Present Value. The later amount is called the Future Value.

In the example about Mr. Whitcomb's milk, we have both changing quantities of goods (the milk) and changing quantities of money (the price).

Changing the quantity is certainly easy to visualize. Changing the price is also readily comprehensible. What is usually difficult to grasp,

however, is the change which occurs when both the quantity and the price remain the same. This leads us to our fourth, and final, scenario. The best example of this scenario is the home mortgage payment.

THE TIME/VALUE OF A HOME MORTGAGE

Let us assume a thirty-year, fixed-rate home mortgage. Let us say you took out the mortgage in 1980 for \$75,000 at a rate of 10%. As such, your first monthly payment in 1980 was \$658.18, and your last monthly payment in 2009 will also be \$658.18. As you can see, there is no change in the dollars. Also, there is obviously no change in the "goods." Your home is the "goods," and it doesn't change at all. The only thing that changes in this example is the time. If the value of money is supposed to change over time, where is this change manifest?

The answer in this case is quite subtle. There really is change. And, the change really does occur in your home!

How can this be so? Obviously, the structure does not change. No, of course not. What changes is the value! In the example about Mr. Whitcomb's milk, the amount of milk was constant and the amount of dollars changed. Then we reversed the example and kept the amount of dollars constant which caused the amount of milk to change.

Here, too, the amount of dollars, \$658.18, is constant, but the house - or, more correctly, the value of the house -- is changing.

In support of this contention, let me pose two questions. How much do you think the home you bought in 1980 will be worth in 2009? Or, conversely, how much of a home do you think you will be able to buy in 2009 with a \$658.18 monthly mortgage payment? Each person reading this book may give a different answer to these questions, but I am willing to bet that 99.9% of the respondents will say that their 1980 home will be worth substantially more in 2009, and that they will not be able to get a very nice new home in 2009 with a monthly payment of only \$658.18.

Now, we have established more or less intuitively that the value of the home is changing, just like the amount of milk did in the previous example. But unlike the milk, we cannot measure the amount of change. You can estimate how much you think your house is worth today, but you will never know for sure unless you sell it. Even more ephemeral is the value of your home in 2009. The best you can do is make an educated guess as to what the value will be in the next nineteen years

based on what changes have occurred in comparable values over the last eleven years.

If you paid \$100,000 for the home in 1980 and you think it is worth \$175,000, then your home has increased in value by about 5.2% a year. You can check this with the formula for calculating the Future Value when the Present Value is known.

First, we convert the assumed Compounding Rate (5.2%) to a decimal (.052) and add the number 1 (.052 + 1 = 1.052), which is the Compounding Factor. Next, we multiply the Present Value (\$100,000) by the Compounding Factor (1.052), the number of times in the Compounding Period (11), as shown in Figure 3-E, below:

Figure 3-E

\$100,000	
<u>x1.052</u>	(1980)
\$105,200	
<u>x1.052</u>	(1981)
\$110,670	
<u>x1.052</u>	(1982)
\$116,425	
<u>x1.052</u>	(1983)
\$122,479	
<u>x1.052</u>	(1984)
\$128,848	
<u>x1.052</u>	(1985)
\$135,548	
<u>x1.052</u>	(1986)
\$142,597	
<u>x1.052</u>	(1987)
\$150,012	
<u>x1.052</u>	(1988)
\$157,813	
<u>x1.052</u>	(1989)
\$166,019	
<u>x1.052</u>	(1990)
\$174,652	

There you have it: \$174,652, or call it \$175,000. This is the Future Value.

Now, if you want to find out how much your home will be worth in 2009, you simply continue the process another 19 times, as shown in Figure 3-F.

There you have it. This is the Future Value of the house for which you paid, or the Present Value of which was, \$100,000 in 1980. So, in the year 2009, the home you paid \$100,000 for in 1980 will be worth the grand sum of \$457,554.

This is quite impressive. But before you start counting your money, please remember back a few pages to our example about the quart of milk. You will recall that today the milk costs 90 cents. Well, if the cost of milk increases as fast as the value of your home, you will be paying \$2.36 for that same quart of milk in 2009! Furthermore, if in 2009 your children buy the exact same quality of home as you bought in 1980, they will have to pay \$457,554 for it!

In our example, we assumed you got a \$75,000, or 75%, mortgage in 1980. If your children get a 75% mortgage in 2009, it will be for \$343,166!

Now, before we leave this example, there are a couple of additional questions which can shed some light on this difficult concept.

How much were you earning the day you bought the home in 1980? How much are you earning now? How much do you think you will be earning in 2009?

If you have had a reasonably normal life, you are earning more now than you were in 1980 and you can expect to be earning considerably more in 2009.

Let us say you were earning about \$32,000 a year in 1980. Your monthly payment of \$658.18 means you were paying \$7,898.16 a year.

Figure 3-F

\$174,652	
<u>x1.052</u>	(1991)
\$183,734	
<u>x1.052</u>	(1992)
\$193,288	
<u>x1.052</u>	(1993)
\$203,339	
<u>x1.052</u>	(1994)
\$213,912	
<u>x1.052</u>	(1995)
\$225,036	
<u>x1.052</u>	(1996)
\$236,738	
<u>x1.052</u>	(1997)
\$249,048	
<u>x1.052</u>	(1998)
\$261,999	
<u>x1.052</u>	(1999)
\$275,623	
<u>x1.052</u>	(2000)
\$289,955	
<u>x1.052</u>	(2001)
\$305,033	
<u>x1.052</u>	(2002)
\$320,894	
<u>x1.052</u>	(2003)
\$337,581	
<u>x1.052</u>	(2004)
\$355,135	
<u>x1.052</u>	(2005)
\$373,602	
<u>x1.052</u>	(2006)
\$393,029	
<u>x1.052</u>	(2007)
\$413,467	
<u>x1.052</u>	(2008)
\$434,937	
<u>x1.052</u>	(2009)
\$457,554	

Divided by your salary, this means you were paying 7,898.16 divided by 32,000, or about 25% of your income for your home. Let us say you are now earning \$60,000 per year. You are still paying \$658.18 a month, or \$7,898.16 a year; but now your mortgage payment is only 7,898.16 divided by 60,000, or about 13% of your salary.

Now, for the good part. If you keep getting raises at the same rate, in 2009 you will be earning about \$160,000! At that point, when you make your last mortgage payment, it will constitute only 7,898.16 divided by 160,000, or just about 5% of your income.

The entire point in this exercise involving mortgage payments, the value of your home, and the amount of your income, is to illustrate that the value of money changes over time. Here is the "time/value theory of money" again. But as you can readily see, it is not the least bit theoretical. It is fact. And very tangible fact, at that.

Now, let us go from examples such as the price of milk or the value of a home -- where the change in the value of money over time is quite apparent -- to the world of financing water and wastewater projects, where it can be less obvious.

THE TIME/VALUE OF PROJECT PAYMENTS

Perhaps the best way to envision the change in the value of money over time when it comes to such matters as water and wastewater improvement projects is to think of it in terms of the purchasing power of the ratepayers. This is very similar to the example about the difference between the mortgage payment and the amount of the homeowner's income. The amount of the mortgage payment remains the same but the homeowner's salary keeps rising. Thus, the value of the mortgage payment keeps declining in relation to the homeowner's income.

By the same token, when the board of directors of a water system elects to finance a project over a number of years, it can be sure, whether the loan payments are the same amount every year or different, that whatever the loan payment amount is in a future year, the actual impact on the ratepayer will be less because his income, or buying power, has increased.

Whenever you begin to have doubts, just remember that you will be earning \$160,000 in the year 2009, and your \$658.18 monthly mortgage payment will have declined from 25% to only 5% of your total income.

Let us say that a water system is adding a substantial amount of new mains, replacing some old mains and installing a new standpipe to increase storage capacity. Let us say the project will cost \$1,000,000.

Now, you could -- theoretically -- bill your users for the full \$1,000,000 today as a surcharge. If you had a large system with 100,000 or so users, you would probably get away with it. But if your system had 1,000 users, you might, indeed, have a rebellion on your hands. In any event, if you did surcharge the users, there would be no doubt that the real cost of the project would be \$1,000,000, and no more.

Let us say, as an alternative, that you consulted three local bankers, each of whom was willing to make your water system a loan of \$1,000,000 to pay for the project, as follows:

Banker A will lend for five years at 8% interest with level principal payments.

Banker B will also lend for five years at 8% interest but with level payments.

Banker C will lend for ten years but at 9% interest and also with level payments.

Now, let's look at the five Annual Payments on the loan from Banker A:

Year 1 -	\$280,000
Year 2 -	264,000
Year 3 -	248,000
Year 4 -	232,000
Year 5 -	216,000

We know from our examples about the milk and the mortgage payment that the value of money changes over time. In the milk example, we could measure the change in the value of money by measuring the change in the amount of milk. In the home mortgage example, we could measure the change in the value of money either by measuring the change in the value of the home or by measuring the change in the homeowner's income relative to his mortgage payment. Here, the value of the new mains and the standpipe doesn't change at all (leaving aside the concept of depreciation). So, what we are effectively doing is measuring the amount of the payment in terms of the ratepayer's rising income or buying power.

The actual measurement of the change in the value of money in this example involves the use of a parameter. A parameter is a constant

number which is, itself, made up of variables. The parameter we can use here is the rate of inflation.

ANNUAL INFLATION RATE AS DISCOUNT FACTOR

The next chapter, Chapter 4, deals specifically with the determination of which (of several) discount factors to use in a given instance. It also illustrates the pitfalls which arise when an inappropriate discount rate is used. For our purposes here, in this chapter, we will assume that the annual rate of inflation as expressed by the Consumer Price Index (CPI) is the appropriate discount rate to use.

The annual inflation rate is published by the federal government in the form of the rate of change of the "Consumer Price Index." The CPI is the cost of a large group of goods and services weighted for the proportion which those particular goods and services make up out of the average household's annual budget. In short, the CPI measures buying power.

Using the year 1967 as a base year, it measures the cost of the same group of goods and services every year and expresses them as a percentage of the cost of the same goods and services in 1967. The rate of change of the annual CPI is widely regarded as the annual rate of inflation. This is a very reasonable number to use in our example for two reasons. First, a homeowner's buying power will remain steady as long as his or her income increases at the same rate as the inflation rate. Second, it is precisely this number, the CPI, which is used in many, many businesses as a basis to determine wage and salary increases. For this reason, the CPI has an almost built-in accuracy and stability factor in that last year's CPI is used to calculate this year's wage increase, which is, of course, reflected in this year's CPI, which is used to calculate next year's wage increase. And so on.

In summary, wages are likely to increase at the same rate as the CPI, or better; so the CPI is a good number against which the cost of a water project reflected in annual water rates can be measured.

As you can imagine, the rate of inflation is a very specific number (and a very important one). You can actually look up the rate for every year going back to 1967, and even back hundreds of years, using other measurements similar to the CPI. But, unfortunately, you cannot look up the CPI for the next five years. Since most financial matters relate to future payments, what can you do? The answer is: guesstimate.

This is not as frivolous as it sounds for two reasons. First, pinpoint accuracy is not necessary. Remember, what we are doing is comparing the cost of alternative loans. We are not trying to put an astronaut on the rim of a specific crater on the moon. We need to be accurate enough to measure which loan costs less, but it would be both unnecessary and frivolous to try to figure it down to the penny.

The second reason is that there is at hand a formal and acceptable method of projecting CPI increases by what statisticians call a "linear regression analysis." Such an analysis involves ascertaining the trend of the CPI over the last certain number of years and then projecting this trend forward. A less formal way of accomplishing the same end would be to take the average of the last five years' CPI's. This, however, would be reasonable only if -- and this is most important -- there were no major and unique economic event which would significantly skew the average of the last five years.

So, as I am writing this chapter, my best recollection is that the CPI's for the last five years or so have been in the 4-6% range. Furthermore, I can't think of any economic event which has happened or is likely to happen which would have the effect of either increasing or decreasing the CPI over the next five years. Under those circumstances, I would feel very comfortable estimating an annual inflation rate of 5% for the next five years.

Now I have made two fundamental decisions. I have decided that I will determine the change in the value of money by measuring it against the rate of inflation. I have also decided that the annual rate of change which I will use is 5%. This number, 5%, is the discount rate.

DISCOUNTING LOAN A

Let us now proceed to discount the loan from Banker A. Since we know precisely how much we will have to pay each year, we must work backward to measure the change in value. In other words, each Annual Payment in a future year will be treated as a Future Value.

Since we know the Future Values of each of the Annual Payments, having calculated them above, we can now proceed to calculate the Present Values for each of them, by Discounting. To do this we first convert our Interest, or Discount Rate, 5%, to a decimal, .05. Then we add the number 1, to get 1.05. Next, we divide 1.05 into the number 1, to obtain .9524, which is the Discount Factor. Finally, we multiply each Future Value by the Discount Factor, the number of times in the

Discount Period. Note that for each Annual Payment, the Discount Period is the number of years from the Present Value until that particular Annual Payment. In other words, it is the number of years from the time the loan is made until that particular loan payment is made. Let us illustrate this point.

If someone agrees to pay you \$100 in one year (Future Value), then it is worth \$95.24 today. We know this by multiplying \$100 by .9524 ($\$100 \times .9524 = \95.24). If someone agrees to pay you \$100 in two years, then it is worth \$90.70 today. We know this by multiplying \$100 by .9524 twice, once for each year between the time the loan is made and the payment is made ($\$100 \times .9524 \times .9524 = \90.70). For three years, you multiply three times ($\$100 \times .9524 \times .9524 \times .9524 = \86.38), and so on. In like manner, we can now determine the real, or discounted, value of the five loan payments in our example, as is shown in Figure 3-G, below:

Figure 3-G

Year	Annual Payment	Discounted Value
1	\$280,000 x .9524	= \$ 266,672
2	264,000 x .9524 x .9524	= 239,465
3	248,000 x .9524 x .9524 x .9524	= 214,245
4	232,000 x .9524 x .9524 x .9524 x .9524	= 190,882
5	216,000 x .9524 x .9524 x .9524 x .9524 x .9524	= <u>\$ 169,259</u>
		\$1,080,523

We can now compare the discounted values of the loan payments with the stated values, as shown in Figure 3-H, below:

Figure 3-H

Year	Stated Value	Discounted Value
1	\$ 280,000	\$ 266,672
2	264,000	239,465
3	248,000	214,245
4	232,000	190,882
5	<u>216,000</u>	<u>169,259</u>
	\$1,240,000	\$1,080,523

What useful conclusions can we draw from this exercise?

The most valuable conclusion is that it will only cost \$80,523 to spread the payments out over five years. If the decision is whether to levy a \$1,000,000 surcharge on the hapless ratepayers all at once or to spread the cost over a number of years, then it is useful to know that the real cost of doing so is really only \$80,523. How so?

First, we know that we are borrowing -- and hence must repay -- \$1,000,000. By subtracting the loan Principal of \$1,000,000 from both the stated value and the discounted value, we can calculate the total amount of interest paid. In stated value, it is \$240,000; in discounted value, it is \$80,523. This means that although the amount paid will be \$240,000, the actual economic value of these payments (or the real cost to the ratepayers in terms of their buying power) will only be \$80,523. In other words, it will cost the ratepayers \$80,523, which is only about 8% of \$1,000,000, for the privilege of paying for the project over five years instead of one.

The most important lesson from the above exercise, however, is the simple fact that the discounted value, or Present Value, of Loan A is \$1,080,523.

DISCOUNTING LOAN B

To obtain the Present Value of Loan B, the first thing we must do is calculate the Annual Payments. We can do this by performing the operations on a calculator according to the instructions in Appendix B, or by looking up the factor on the tables in Appendix C and performing the appropriate calculation.

No matter which method you use, you will find that the Annual Payment for Loan B, with \$1,000,000 of Principal at an Interest rate of 8% for a term of five years, is: \$250,456. Note that Loan B is a Level Payment Loan. This means that all of the Annual Payments in each year will be equal. Finding the discounted value, or Present Value, of these Annual Payments is easy using the same method as we used above for Loan A. This is demonstrated in Figure 3-I, on the next page.

Figure 3-I

Year	Annual Payment	Discounted Value
1	\$250,456 x.9524	= \$ 238,534
2	" x.9524 x.9524	= 227,180
3	" x.9524 x.9524 x.9524	= 216,366
4	" x.9524 x.9524 x.9524 x.9524	= 206,067
5	" x.9524 x.9524 x.9524 x.9524 x.9524	= <u>196,258</u>
		\$1,084,405

In short, the Present Value of Loan B is \$1,084,405.

DISCOUNTING LOAN C

Loan C is also for \$1,000,000, but for a 10-year term and at an Interest rate of 9%. Like Loan B, Loan C is also a level payment loan; so, again, all of the Annual Payments will be equal.

By again consulting either Appendices A, B, or C, we can calculate an Annual Payment of \$155,820. To find the discounted value, or Present Value, of these payments we use the same procedure as we used above for loans A and B. The discounted values are (without showing all of the steps), as indicated in Figure 3-J, below:

Figure 3-J

Year	Annual Payment	Discounted Value
1	\$155,820	\$ 148,403
2	"	141,339
3	"	134,611
4	"	128,204
5	"	122,101
6	"	116,289
7	"	110,754
8	"	105,482
9	"	100,461
10	"	<u>95,679</u>
		\$1,203,323

Now, let us compare the discounted values of all the loans, as shown in Figure 3-K, below.

Figure 3-K Discounted Values

Year	A	B	C
1	\$266,672	\$238,534	\$148,403
2	239,465	227,180	141,339
3	214,245	216,366	134,611
4	190,882	206,067	128,204
5	169,259	196,258	122,101
6	-	-	116,289
7	-	-	110,754
8	-	-	105,482
9	-	-	100,461
10	-	-	95,679
	<u>\$1,080,523</u>	<u>\$1,084,405</u>	<u>\$1,203,323</u>

These numbers all look very nice. But what is their importance?

The single most important aspect of these Discounted Values is that they are now all the same. They are all Present Values. They can now be compared with each other.

As such, they unequivocally prove that the loan with the lowest cost to the system's ratepayers is Loan A. Some numbers may lie; but these don't. The loan with the lowest Present Value costs the least.

We have already mentioned the old saying, that you cannot add apples and oranges. I don't particularly like this analogy because it might leave people with the lingering notion that since apples and oranges are both fruit, there is, in fact, a common basis for adding the two together. After all, two apples and three oranges do equal five pieces of fruit. As far as adding together the Annual Payments in, say, years four and five of any loan transaction are concerned, this absolutely cannot be done. There is no common basis whatsoever. For this reason, I prefer using the phrase, "cabbages and kings," from Lewis Carroll's Through the Looking Glass. Nobody is going to mistakenly try to add cabbages and kings.

Loans A, B, and C, as they were originally stated, cannot be compared. They are cabbages and kings. They cannot be compared with each other. Even when you calculate the Annual Payments for each, they are still cabbages and kings. They still cannot be compared.

Only when all of the Annual Payments are reduced to Present Values -- when all of the loans are cabbages -- can they be compared.

The purpose of this chapter was to demonstrate how different financing options can be compared by reducing all future loan payments to Present Values. Once they are all stated in Present Value terms, they can be readily compared. Now that we know what the actual cost of each loan is, we have accomplished the first step in thoroughly evaluating the financing options available to water and wastewater systems. Chapters 4 and 5 will add two more necessary steps. Chapters 6 and 7 will return to examples such as those above, examples to illustrate how a full and totally comprehensive evaluation of different financing options can be made on either an annual cost basis or a total cost basis.

* * * * *

Before leaving this chapter, however, we have a piece of unfinished business.

We began this chapter with a question of which was cheaper: a financing (Offer A) with \$190,000 Annual Payments for 10 years; or a financing (Offer B) with \$100,000 Annual Payments for twenty years?

By adding the stated values of the Annual Payments, Offer A requires \$1,900,000 in total payments, and Offer B requires \$2,000,000 in total payments. It seems, therefore, that Offer A might be \$100,000 cheaper. But then we said no, Offer B was cheaper by some \$220,907. We then left the matter hanging.

By now you realize that the answer lies in the Present Value of each of the loan payments.

You now know that you cannot add up each of the Annual Payments in any loan. Annual Payments are cabbages and kings. You cannot add up the 10 Annual Payments of \$100,000 in Offer A and get \$1,900,000; because the number \$1,900,000 has no meaning at all. It is as if you tried to add six cabbages and four kings. The answer is nonsense.

In order to compare Offer A and Offer B, we must reduce all of the annual payments in each loan to their Present Values.

To do this, we begin by realizing that each Annual Payment is a separate Future Value. We now know that we must discount these Future Values to reach their Present Values. To do so, we take a Discount Rate of 5% (for the reasons mentioned previously), convert it

to a decimal (.05), add the number 1 (1.05) and divide it into the number 1 to get the Discount Factor ($1 / 1.05 = .9524$). Next, we multiply each Future Value by the Discount Factor the number of times in the Discount Period for each Annual Payment. Without showing all of the multiplication, here are the Present Values in Figure 3-L, below:

Figure 3-L Present Values of Offer A and Offer B

<u>Offer A</u>		<u>Offer B</u>	
Stated Value	Present Value	Stated Value	Present Value
\$190,000	\$180,956	\$100,000	\$95,240
"	172,342	"	90,707
"	164,138	"	86,389
"	156,326	"	82,277
"	148,885	"	78,360
"	141,798	"	74,630
"	135,048	"	71,078
"	128,620	"	67,695
"	122,498	"	64,472
"	116,667	"	61,404
		"	58,481
		"	55,697
		"	53,046
		"	50,521
		"	48,116
		"	45,826
		"	43,644
		"	41,567
		"	39,588
		"	37,704
	<u>\$1,467,278</u>		<u>\$1,246,442</u>

Now, by subtracting the sum of the Present Values of all of the Annual Payments in Offer B from the sum of the Present Values of all of the Annual Payments in Offer A, as follows,

$$\begin{array}{r}
 \$1,467,278 \\
 - \quad 1,246,442 \\
 \hline
 \$ \quad 220,836
 \end{array}$$

you can see that Offer B is the better offer by a margin of \$220,836. As the mathematicians say: Q.E.D.

Chapter 4

Determination of a Discount Rate

Under most circumstances, the determination of the appropriate discount rate to use in any given instance should not occupy an entire chapter in a book on water project financing. But the purpose of this book is to give the non-financial director or manager of a water or wastewater system the background he needs to understand what the system's bankers, investment bankers and financial advisors are telling him. In this regard, one of the most important lessons to be learned is that discounted numbers may not be what they seem. They can be manipulated to arrive at different conclusions. If this happens, the manipulation will occur in the selection of a discount rate. For that reason, the selection of the appropriate discount rate takes on a somewhat added significance.

The Use of Present Values and Future Values in Determining the Discount Rate.

To illustrate how Present Values and Future Values affect determinations of the discount rate, let us look at two simple examples of Present Value and the same examples as Future Values.

What is the Future Value of \$100 in one year at a compound rate of 3%?

The answer is: $\$100 \times 1.03 = \103 .

What is the Future Value of \$100 in one year at a compound rate of 10%?

The answer is: $\$100 \times 1.1 = \110 .

Notice that the Future Value is higher in the second example where the compound rate is higher. What you are seeing here is a general rule:

The higher the compound rate, the higher the Future Value.

Now, let us look at the same set of numbers from the Present Value perspective.

What is the Present Value of a payment of \$100 in one year at a discount rate of 3%?

As you recall from Chapter 3, to obtain the Present Value of a future payment without a calculator, you first take the discount rate (3%) converted to decimal form (.03) and add the number one (.03 + 1 = 1.03). Next find the reciprocal by dividing this number into the number one ($1 / 1.03 = .9709$). Then multiply the future payment (\$100) by this number (.9709) as many times as there are years to the future payment (1), as follows:

$$\$100 \times .9709 = \$97.09$$

Now let us perform the same operation for the \$100 future payment at a discount rate of 10%.

First, we convert 10% to decimal form: .1, then we add 1 to get 1.1. Next we find the reciprocal by dividing 1 by 1.1, where we get .9091. Finally, we multiply the future payment (\$100) by this number (.9091) as many times as there are years (1) to the future payment, as follows:

$$\$100 \times .9091 = \$90.91$$

Now we can compare the Present Values of a future payment of \$100 at two discount rates.

We can see that the Present Value with the 3% discount rate is \$97.09.

And we can see that the Present Value with the 10% discount rate is \$90.91.

Clearly, the Present Value is much larger with the 3% discount rate than it is with the 10% rate. Again, what we are witnessing is the operation of a general rule:

The lower the discount rate, the higher the Present Value.

Why is it important to know that the higher the compound rate the higher the Future Value, and the lower the discount rate the higher the Present Value?

It is important to know these rules when someone is trying to convince you of something. The "something" they will usually be trying to convince you of, is that you can either make a lot of money or save a lot of money for your system by doing whatever that person suggests.

Manipulating and Distorting Real Values.

Two extremely clever ways of doing this are by showing you how small your project payments or how large your savings on the project payments will be.

Project payments can be calculated by the Level Payment Method, the Level Principal Payment Method or the irregular method, as we saw in Chapter 2. If there are two sets of project payments to be compared, the "savings" can be calculated by subtracting the larger payment from the smaller one in each year. Once these amounts have been ascertained, their Present Value can be obtained by discounting.

Let us say that you receive a proposal from Banker A which will require your system to pay out \$10,000 a year for five years. As part of his sales pitch, the banker tells you that although the actual cash outlay will be \$10,000 for five years, or \$50,000, on a fully discounted basis it will only cost your ratepayers \$30,000.

The next day you are sent another proposal, this time from Banker B, for an investment plan for your reserve account where your system will receive \$10,000 a year for five years, for a grand total of \$50,000. Now, you keep asking Banker B what the discounted value of the investment earnings is. He keeps dodging the issue because the discounted number is always a smaller number, and he wants to keep you focused on the full amount, despite the fact that you will not receive

most of it for a few years. Finally, he gives in and tells you that the fully discounted value is \$49,000.

Now, let us say you make the inexcusable mistake of calling a public hearing to get public reaction to these proposals. And, unfortunately, not only are over 90% of your ratepayers political activists who like to show up at every meeting, but 90% of them are also CPA's. You have just created what might well be your worst nightmare.

The problem you will encounter centers around the subject matter of this chapter: the Determination of the Discount Rate. Or, more appropriately, the Determination of the Correct Discount Rate.

Let us assume, after thoroughly reading this chapter, you independently concluded that the correct discount rate to use for the next five years is 5%. Table 4-A, below, shows the discounted values for \$10,000 a year for the next five years.

Table 4-A

\$10,000	-	\$9,524
\$10,000	-	\$9,070
\$10,000	-	\$8,638
\$10,000	-	\$8,227
\$10,000	-	<u>\$7,835</u>
		\$43,294

As you can see, the discounted value of \$10,000 for five years is not what either banker said it was. Here is what happened.

Banker A wanted to emphasize how little your ratepayers would pay. How small their annual payments would be. Banker A, having read this book himself, and having remembered the axiom that the higher the discount rate, the lower the Present Value, chose a discount rate of 10%. Table 4-B, below, shows the discounted values of five \$10,000 payments at a discount rate of 10%.

Table 4-B

\$10,000	-	\$9,091
\$10,000	-	\$8,264
\$10,000	-	\$7,513
\$10,000	-	\$6,830
\$10,000	-	<u>\$6,209</u>
		\$37,907

If you tell your ratepayers that the real value of project payments your system must make is only y ; and the discount rate you used to calculate that value is unrealistically high, then you will be open to criticism for underestimating the cost of the project.

Now let us look at Banker B's proposal.

Banker B has an investment proposal. He is trying to persuade you to invest a fund which your system controls. In short, Banker B wants to show you the largest return possible on your investment, the highest numbers possible. When you asked him what the discounted value of the earnings on the investment was, he was reluctant to tell you because discounted numbers are, by definition, lower. When you finally got him into a corner, however, he did remember reading this book, and this chapter in particular. He also remembered the axiom: the lower the discount rate, the higher the Present Value. Keeping that in mind, when you pressed him on it, he finally did give you a discounted value; but the discount rate he used was 1%. (What is the matter with 1%? After all, 1% is a nice, low, conservative number, isn't it?) Table 4-C, below, shows the discounted values of the five \$10,000 payments at a discount rate of 1%.

Table 4-C

\$10,000	-	\$9,901
\$10,000	-	\$9,803
\$10,000	-	\$9,706
\$10,000	-	\$9,610
\$10,000	-	<u>\$9,515</u>
		\$48,535

If you tell your ratepayers that a course of action you propose will result in a savings to their system of x ; and the discount rate you used to achieve the projected savings is unrealistically low, then you will be open to criticism for overestimating the savings.

Now that you realize what Bankers A and B have done, and you realize what the angry hall full of CPA-ratepayers is going to do, here is how to handle the situation.

Stride imperiously to the front of the room. Raise your arms to silence the din. Tell the crowd that you called the meeting because two Bankers had attempted to hoodwink your system -- by underestimating costs and by overestimating income -- into taking some ill-advised financial actions; and that you wanted to have a meeting to publicly

denounce the Bankers and ban them from any future dealings with your system. As they carry you from the hall on their shoulders amidst a thunderous hail of grateful applause, don't forget you owe it all to the two axioms: the higher the discount rate, the lower the Present Value; and the lower the discount rate, the higher the Present Value.

Whenever confronted with a proposal involving a series of future payments which allegedly will mean either a greater savings or a lower cost to your system, I would strongly recommend testing the value of those savings by doing the Present Value calculation for at least several different interest rates. Which exact discount rates you might want to use will be discussed below.

A much simpler variation of this same problem arises on the question of investing funds of the system. This is simpler because everyone knows that the higher the rate of interest on your account, the more money you will earn. Another way of saying this is that the higher the rate of interest on your account, the more money you will have when you go to withdraw it. Please note that both of these expressions are simply a restatement of the general rule: the higher the compound rate, the higher the Future Value.

By reference to the example above, if you invest \$100 of system funds for one year at a rate of 3%, you will have \$103 at the end of the year.

If you invest the \$100 at 10%, you will have \$110 dollars at the end of the year.

In other words, the Future Value will be higher because the compound rate is higher.

The point here is to beware of the use of discount rates and compound rates in the hands of anyone trying to sell you anything or persuade you to do anything. The best way to guard against being fooled by this type of manipulation is to do the numbers yourself at several different rates. Whether you use a calculator or not, it is clearly worth the small effort of the hour or so it would take to do even thirty or forty years of calculations by hand, just for the peace of mind of knowing what the real values and the real costs of a project actually are.

SELECTING A DISCOUNT RATE

There are really only three sensible discount rates for a water system to use in doing the financial calculations for its projects. In technical terminology these are: the CPI, the reinvestment rate and the cost of

funds rate. The CPI is, of course, the Consumer Price Index. The reinvestment rate is the rate, either short-term or long-term, at which the system could invest its funds. The cost of funds is the rate of interest at which the system could borrow, again, either short-term or long-term.

Time Frame of Reference.

All of these rates imply a time period of reference. Therefore, not only do you have to choose which index you will use, but you have to select the time frame of reference as well.

For example, the CPI is published monthly, quarterly, and annually. Which one should you use? Or, should you use some combination or average of the CPI at several intervals?

The reinvestment rate is even more varied than the CPI. You can invest funds on a daily basis, for a week, a month, any number of months, a year and any number of years up to forty years. For each time period, there is a different rate. For an analysis of how individual rates relate to such time periods, please turn to the last section of Chapter 10, where the "yield curve" is discussed.

The cost of funds rate generally has two, sometimes three, but always a very limited number of expressions. There are two basic reference points. The first is a floating rate, which is used for short-term borrowings, and is expressed as a function of the prime rate. If your system is a unit of government and is tax-exempt, you will be able to borrow at rates below your local bank's prime rate. Rates of 50%, 60%, 75%, up to 90% of prime are common.

If your district is a cooperative or is a privately owned utility, then your short-term rate will be something over the prime rate, such as prime plus one ($P + 1$), or prime plus two ($P + 2$), i.e., one or two percentage points over the local bank prime rate. If you are a very old, large district with a long and excellent credit history you will be able to borrow at the prime rate itself.

Whether you can borrow at 50% or 90% of prime, if you are a unit of government, or at P or $P + 2$, if you are private, is a function of two factors: first, the credit history and strength of your system; and, second, the amount of competition there is among local banks for your business. Please see Chapter 18 for a discussion of the prime rate as well as the effect of competition on bank rates.

The second rate is generally a fixed rate which is used for longer-term borrowings. It is expressed simply as a number. Again, it will be

different depending on whether your system is a tax-exempt borrower. For example, if a bank were willing to lend for, say, ten years to a tax-exempt borrower at 8%, it might charge a taxable borrower, of comparable credit quality, 11%.

For the reinvestment rate and the cost of funds rate, the averages for the last year (or longer, if there has been an unusual economic event) will generally be fine.

The Consumer Price Index (CPI).

The Consumer Price Index is a measure of change in prices for a market basket full of a wide variety of consumer goods and services such as clothing, food, utilities, housing, transportation and entertainment. It is compiled and published on a monthly basis by the U.S. Bureau of Labor Statistics.

Assuming the CPI turns out to be the appropriate rate to use in a given instance, the question is: which expression of the CPI should be used? Last month's CPI? The average of the last six months? The CPI for the last year?

The average of the last five years' of the Consumer Price Index is to me the most sensible rate to use to discount future costs. If there has been a virtually unique economic event (e.g., the 21.5% prime interest rate spike in 1981 or the Arab oil embargo in 1974) in the last five years, then the reference period should be extended to ten years.

The reason for favoring the five-year average is that, although the last five years' CPI cannot flawlessly predict the next five years' growth in costs, there is no other set of numbers which can do so any better.

If you took the average change in the cost of Operations & Maintenance for your water or wastewater system for the last five years, the chances are good to excellent that it would fall within 10%, plus or minus, of the average of the CPI over the same period.

If you took the average change in those costs over the last forty years, it would as a virtual certainty fall within 10%, plus or minus, of the average of the CPI over the same forty year period.

The point here, of course, is that changes in costs do average out; and that they average out very well, indeed, over time. Why not, therefore, use a measurement which reflects this process. The CPI does just this.

Now, having established that the CPI does an excellent job of tracking historical costs, why, if at all, is this significant in predicting future rates?

We must begin any answer with the usual admonition that the future cannot be predicted. This is especially true when using past events to predict future events. Now, having begun with the proper note of caution, we can certainly say that the major reason the CPI is usually so reliable is that its use has become somewhat circular. By this we mean that the CPI has become so well known that it has come to be used to determine next year's rates for a wide variety of economic activities.

For example, many wage rate increases are pegged to the CPI. Many commercial rent rate increases are determined by the CPI. In short, many of the actual expenses which a system must pay, especially to third parties, increase, themselves, at a rate equal to the CPI. They do so not by accident, but rather because of agreement.

In other words, lease agreements between landlords and tenants provide for annual rent increases based on the prior year's CPI. If you are leasing space, therefore, you already know your rent will go up according to the CPI. If your system's workers receive annual wage increases based on the CPI, then you know that your labor costs, too, will increase according to the CPI. Thus, if you are making projections for your whole budget, you already know that the rent component and the labor component will increase at the rate of the CPI.

If these two components -- and any others equally affected by the CPI -- constitute a large enough part of a systems budget, then the entire budget itself will increase at the rate of the CPI. You can now see what we mean by the circularity of the CPI.

The CPI is a strong and broad measurement, on its own. The fact that it is so widely used as a basis for future cost increases, in and of itself, makes it in many ways a self-fulfilling prophecy. This circularity makes it all the more valuable in projecting cost increases into the future.

Please notice that throughout this subsection we have talked of the CPI in terms of its use as a predictor of cost. It is not only an excellent predictor of cost, but also of those other financial factors, such as rates, which are inextricably bound to underlying costs.

If you needed, for example, to predict the rates your system would putatively charge in the year 2025, probably the best place to begin would be to separate out the Operations & Maintenance cost and determine its Future Value by using the formula contained in the last chapter and a discount rate equal to the CPI for the last five years.

The CPI can also be used to predict certain replacement costs. For example, common machinery and vehicles need to be replaced. If a certain machine will have to be replaced in five years, then you might take today's cost as the Present Value and compute, using the formula in

the last chapter, the Future Value by using a discount rate equal to the CPI for the last five years.

In addition, and as a final note about the CPI, you should be aware that because prognostication is not an exact science, or even a science of any kind, you will not be expected to be exact (nor is there any good reason why you should be) in your estimates. Therefore, if the Bureau of Labor Statistics reports that the average CPI for the last five years was 4.83862%, you can easily use 5% for five-year projections or less and 4.8% for longer projections.

Just remember that the CPI is a measurement of historical cost. It is extremely useful in estimating cost. But as you know, cost is just one component of most financial concepts. As far as your system is concerned, the cost of Operations & Maintenance is just one of the elements of the system's total income and expenses.

A final consideration about the use of the CPI is that it only works for cost estimates or for other estimates, such as rates, which are closely tied to cost. You should not, for example, try to project future earnings on a fund by using the CPI. For measuring numbers other than cost, one of the other indices, such as the reinvestment rate or the cost of funds rate, will be more accurate.

The Reinvestment Rate.

The reinvestment rate is the amount of money you could earn, if you invested money prudently. The "money" we are talking about is any fund or funds which a system has legally under its control and which does not need to be spent until some time in the future. By the word "prudently," we are referring to sane and normal investments -- the type which a "prudent man" would make when entrusted with funds belonging to someone else. Generally speaking, when it comes to public funds, investments are limited to obligations of the U.S. government, agencies of the United States, or other obligations which are guaranteed by the U.S. government. (These matters are governed by state law. Please check with your system's counsel to ascertain the legal investment criteria for public funds in your state.)

Let us say that you currently have \$50,000 in a particular fund which is earmarked for a new pumphouse. You plan on replacing the old one in five years. If you don't add any more funds to the account, how much will you have in five years?

This is, of course, a simple Future Value problem, the formula for which is in Chapter 3. The formula, however, requires the use of a discount rate. Which discount rate will you use?

As you might imagine, the reinvestment rate is designed specifically for situations such as this. But what actually is the reinvestment rate?

If you are talking about five years or less, you can ascertain the reinvestment rate by simply checking with two or three local banks. They will be able to tell you directly what the rates are for Treasury Bills and Notes in the maturities you are interested in. They will also be able to give you the rates for any government agency paper as well as the rates on their Certificates of Deposit (CD) for the appropriate time period. Certificates of Deposit of banks which are members of the Federal Deposit Insurance Corporation (FDIC) are insured by the United States government for amounts up to \$100,000 per customer. (Note that the \$100,000 limit is by customer, not by account.) They will also be able to give you rates for any other legal investment in your state.

Whatever category of legal investment in your state bears the highest rate of interest is the category you should use. And, the average of three banks' rates of interest for such instruments will very adequately serve as the reinvestment rate. Generally speaking, the CD rate will be the highest of the short-term rates for legal investments. So, in most cases, the average of the rates which three banks pay for their CD's for a given maturity will serve as the reinvestment rate.

For longer terms, banks do not have CD's. Nor are they usually willing to guaranty a rate of interest for a long period of time. Thus, in the case of longer maturities, the local banks may not be able to offer the best investment rate. But they will be able to tell you what the prevailing long-term rates are for the various kinds of legal investments. So, in such case, where different banks are not offering different rates on their own certificates, the highest interest rate on any legal investment for the desired maturity then becomes the reinvestment rate which you should use.

The Cost of Funds Rate.

The cost of funds rate is the rate at which a system borrows. That is all there is to it.

The cost of funds rate is, literally, used to calculate the cost of funds which a system borrows. It is also used in calculations involving funds which a system either has not yet borrowed, or is not going to borrow.

In other words, it is used to make projections and to make up hypothetical examples against which costs can be measured.

A good example might be an exercise to determine whether it is financially wiser to levy a surcharge for two or three years and invest the funds before and during construction, or to borrow the funds from the bank during the construction period, then issue long-term bonds to pay off the bank loan.

In this case you would first use the reinvestment rate to determine how much interest would be earned on the funds provided by the surcharges. Then, one borrowing rate would be used to determine at what rate the system could borrow from the bank during the construction period. Finally, another borrowing rate would have to be estimated for the long-term bond which would be issued to pay off, or take out, the bank loan.

The borrowing rate is the simplest rate to determine. You simply need to determine the maturity and then consult with one or more bankers and investment bankers. They will be able to give you the rate at which an institution (the bank) will lend to your system, but also the rate at which your system can borrow in the public market (the investment bank). The lowest rate will be your "borrowing" rate.

The borrowing rate for your system will be a reflection of two factors. The first is the rate at which banks will lend, for a given term, to their customers with the highest credit ratings. The second factor is the relative quality of your system's credit. In short, there is an absolute minimum rate at which a bank will lend to its best customers. All other borrowers must pay a premium.

* * * * *

As you know, the ability to calculate Present Values and Future Values is the key to being able to make meaningful comparisons among alternative financial proposals. To do so, we must use compound rates and discount rates. And, as you have seen in the chapter above, the determination of the correct discount rate is one of the most important factors involved in making the correct financial choices.

Chapter 5

Comparing Upfront and Annual Costs

At least once a month, the real estate section of most newspapers carries information on the availability of home mortgages as well as their rates. You will see such items as this:

Mortgage Bank A: fixed-rate loan, 30 year term, 10% interest rate, two points upfront.

Mortgage Bank B: fixed-rate loan, 30 year term, 10.75% interest rate, no points upfront.

First, in case you are not familiar with the terminology, a "point" is one percent. Two points are two percent. And so on. So, in the example above, the Bank A mortgage requires "two points upfront." This means that 2% of the mortgage amount, or \$2,000 on a \$100,000 loan, must be paid in cash at the closing of the loan.

Which of these two home mortgages would you prefer?

When we say, "Which do you prefer?," we are obviously asking which is the cheaper mortgage. As you can see, both mortgages have fixed rates. Both have thirty year terms. The only two aspects in which they differ are in their interest rates and in the fact that one requires two points to be paid while the other requires no points.

Mortgage A has a 10% rate but 2 points. Mortgage B has a 10.75% rate but no points.

In short, when you reduce the question to its most basic terms, what we are really asking is which is cheaper, the two points, or the extra .75% interest.

This question illustrates a problem which is common to many different kinds of financings. The problem arises from mixing annual costs with one-time costs which are commonly paid at the loan closing and which are generally referred to as "upfront costs." How can these two different types of costs be compared? In this chapter, we will analyze these types of costs and see if we cannot find a common basis for comparison.

Please be aware of the fact that when we say we are comparing loans with different upfront fees, what we are actually doing is comparing loans of different principal amounts.

As you will see below, a \$10,000 loan where you have to pay the banker a 2%, or \$200, fee at closing, can just as easily be considered a \$9,800 loan. Another way of expressing this is by saying that the proceeds of the loan are less than the loan itself. This is the scenario referred to in the "Principal" section of Chapter 2, where you wind up paying back more than you actually received.

In Chapter 3, we worked with home mortgages as an example. They are probably the most familiar type of financing, but they are surely the most tedious to work with. As you might have guessed from our work in Chapter 3, at least one of the methods of comparing costs in different years involves calculating Present Values. This, in turn, requires separate calculations for each Annual Payment. And, in the case of home mortgages, we would normally be working with thirty-year loans, which would require thirty long and tedious calculations. To avoid this needlessly repetitive work, we will use five-year Auto Loans instead of thirty-year mortgages as our example.

So, instead, let us say you turn to the automobile section of your newspaper, where two of your local banks have decided to publish the following information:

Bank A Auto Loan: Five year term, fixed-rate, 10% interest rate, two points upfront.

Bank B Auto Loan: Five year term, fixed-rate, 10.75% interest rate, no points upfront.

Now, which of these two auto loans would you prefer? Let us assume you want to borrow \$10,000. The two points in Auto Loan A are, thus, 2% of \$10,000, or \$200.

Just as in the home mortgage advertisement, the two loans contain a mix of annual costs and upfront costs.

There are two basic methods of comparing these types of costs. The first, as you might have guessed from the references to Chapter 3, is the Present Value Method. The second is the True Interest Cost (TIC) Method. We will now analyze these two loans using each of these methods and see if we can develop a basis of comparison.

The Present Value Method.

The first step in comparing costs by the Present Value Method is to ascertain the method of payment for both loans. In our example, the payment method for neither loan was specified. We know, therefore, from Chapter 2, that when no payment method is specified, the level payment method is assumed.

We know that both loans have the same term (5 years). Only the interest rates are different. When only the interest rates differ and both loans use the Level Payment Method, the loan with the higher interest rate will have the higher annual debt service payment. Thus, we know that Auto Loan B will have the higher annual debt service payment. The question now becomes whether the difference between the annual debt service payments on Auto Loan B and Auto Loan A exceeds the \$200 upfront fee on Auto Loan A.

We know that both Auto Loans have five annual debt service payments and, since both use the Level Payment Method, each annual debt service payment will be the same for each loan. Thus, the difference between the annual debt service payments for Auto Loan A and Auto Loan B will also be the same each year. So, we will have the same amount every year for five years.

Now, we know from Chapter 3 that we absolutely cannot add these amounts together because they occur in different years. We cannot simply find the difference between the annual debt service payments for Auto Loans A and B, multiply them by five, and then subtract them from the extra \$200 upfront cost on Auto Loan A. Annual debt service payments in different years are cabbages and kings. They cannot be added together.

Chapter 3 provides a method for adding different costs or different payments which occur in different years. The method, of course, is to reduce future costs, or Future Values, to Present Values.

The difference between each annual debt service payment in Auto Loans A and B is a Future Value. To reduce these Future Values to Present Values we would multiply each Future Value by a Discount

Factor as many times as there are Discount Periods for that particular annual debt service payment. Thus, for example, we would take the difference in the two annual debt service payments in Year One and multiply it by the Discount Factor one time. We would then take the difference in the two annual debt service payments in Year Two and multiply it by the Discount Factor two times. And so on. In Chapter 3, we did this exercise for a thirty-year mortgage. It is a tedious process, indeed. At the end, we would add all of the Present Values for all of the annual debt service payments to arrive at the Present Value for all of the annual debt service payments. Then we would subtract this number from the \$200 upfront payment in Auto Loan A. We will now do this exercise for the two Auto Loans.

The first step is to find the annual debt service payments for both loans. From Chapter 2, we know that we can find the annual debt service payment for a Level Payment Loan by either using the calculator steps in Appendix B, or the tables in Appendix C.

By whichever method you use, the annual debt service payment for Auto Loan A is \$2,638 and the annual debt service payment for Auto Loan B is \$2,689.

The second step is to find the difference between the annual debt service payments for the two loans. The difference between the two annual debt service payments is \$51 per year ($2,689 - 2,638 = 51$).

The third step is to find the Present Value of the \$51 difference in the two annual debt service payments in Years One through Five of the loan term. To accomplish this, we must determine a Discount Factor and to do this, we must settle on a Discount Rate.

Selecting a Discount Rate.

Since we are dealing with loans which have known rates of interest, should we use one or the other of the interest rates on the two loans? We also know from Chapter 4 that we are generally safe in using an approximation of the rate of inflation as a Discount Rate. We could, therefore, use 5%.

Or, is there any other rate which might be better to use?

As was discussed in Chapter 4, another rate which could be used is what we called the Reinvestment Rate. This is the rate at which you could invest the \$10,000 for the same term, i.e., five years. The assumption here is that you have, in hand, the \$10,000, and are going to make a decision whether you should spend the \$10,000 on the car and

not borrow at all, or whether you should invest the \$10,000 and borrow another \$10,000 to pay for the car. (As you can undoubtedly see, there may be tax ramifications here in that the interest you earn may be taxable and the interest you pay may be deductible. But that is not the subject under consideration here. So, for the purposes of our example, let us say that the question is tax neutral.)

At any given time, it is a good bet that if a bank is willing to lend you money in the 10% range for five years, then that same bank should not be willing to pay more than 7% for a five-year Certificate of Deposit.

In this case, since we are dealing with a personal loan, as we discussed in Chapter 4, the best rate to use is probably the Reinvestment Rate, or 7%.

Now that we have selected a Discount Rate, we can calculate the Discount Factor by first converting 7% to a decimal, or .07, then adding the number 1 to get 1.07, and then dividing this number into the number 1 to get .9346. This is the Discount Factor.

To get the Present Values for the differences in each of the five annual debt service payments on the two Auto Loans, we now multiply the difference in the annual debt service payments by the Discount Factor as many times as there are Discount Periods for each annual debt service payment, as follows:

Figure 5-A

Discount Period	Difference in Annual Payments	Present Values
1	\$51	\$47.66
2	"	44.55
3	"	41.63
4	"	38.91
5	"	<u>36.36</u>
		\$209.11

We have now established that the annual debt service payments for Auto Loan B are \$209.11 higher than the annual debt service payments for Auto Loan A. But since Auto Loan A requires an upfront payment of two points, or \$200, we must now subtract the Present Value of the additional annual cost in Auto Loan B from the additional upfront cost

in Auto Loan A. We can now do this because both numbers are Present Values.

We reduced the Future Values of the differences in the two annual debt service payments to Present Values, and then we added them up to get \$209.11. The \$200 upfront payment in Auto Loan A is, itself, a Present Value. Since they are now both Present Values we can now compare them. They are no longer cabbages and kings. They are either both cabbages or both kings, as you like.

So, we now subtract \$200 from \$209.11 to learn that the entire difference between Auto Loan A and Auto Loan B is \$9.11.

If the difference between two \$10,000 loans for five years is only \$9.11, then you might as well make up your mind on the basis of which bank is closer, since you are likely to burn up more than \$9.11 in gas in getting to the farther bank.

Before we leave the Present Value Method, however, there is one thing you should be aware of. You recall that a few paragraphs above we were deciding whether to use 5%, 7%, or 10% as the Discount Rate. Here is what would have happened had we chosen any of these Discount Rates:

Figure 5-B

Discount Rate	Present Value of Annual Payments
5.0 %	\$220.80
7.0 %	209.11
10.0 %	193.33

Please note that if we use 5% or 7% as the Discount Rate, Auto Loan A winds up cheaper because the Present Value of the difference in the Annual Payments on the two loans exceeds the \$200 upfront fee required on Auto Loan A. But if we had used 10% as the Discount Rate, then Auto Loan B would have been cheaper because the Present Value of the difference in the Annual Payments on the two loans is less than the \$200 upfront fee on Auto Loan A.

This problem with the Discount Rate illustrates two things. First, as you have seen in Chapter 4, beware of people trying to sell you things based on Present Values. It is one thing when you, yourself, are doing

calculations for your own information; but it is another thing entirely when someone is trying to sell you something. In other words, by choosing different Discount Rates, unscrupulous people can manipulate true value. Always heed the advice in Chapter 4. Check out the alleged savings (or benefit) yourself, by doing the calculation with at least a couple of different Discount Rates.

The True Interest Cost (TIC) Method.

The True Interest Cost (TIC) Method involves looking at the whole loan transaction is a slightly different way.

If, at the closing, you were sitting across the table from the banker on Auto Loan A, he would wind up giving you (or the dealer from whom you are buying the car) a check for \$10,000, and you would give the banker a check for \$200.

Now, isn't this exactly the same thing as borrowing \$9,800 in the first place?

Of course it is. You are actually borrowing only \$9,800, but you must repay \$10,000, plus interest on the full \$10,000. Your annual debt service payment on Auto Loan A would still be \$2,638.

Now, hold onto your hat. Here comes the black magic.

What interest rate would you be paying if your annual debt service payment was \$2,638, but the amount of the loan was only \$9,800?

Auto Loan A requires you to make five annual debt service payments of \$2,638 each, for a total of \$13,190. Every loan can be broken down into principal and interest. If you are borrowing \$10,000, you can determine the amount of interest you are paying by subtracting the principal from the total of the annual debt service payments. In this case, you would subtract \$10,000 from \$13,190, leaving \$3,190. This sum, \$3,190, is the total amount of interest you will pay on the loan.

But what if you think of the transaction as a \$9,800 loan instead of a \$10,000 loan? In that case, by subtracting \$9,800 from the total of the annual debt service payments, which is still \$13,190, you would find you are paying \$3,390, instead of \$3,190.

If you spend a minute looking at the admittedly complicated procedure for calculating annual debt service payments in Appendix A, you can see that there are only four elements involved in the calculation. They are: the principal amount, the interest rate, the term, or period of years, and the answer, which is the annual debt service payment.

In our example, the annual debt service payment stays the same, \$2,638. So does the term, five years. The principal decreases from \$10,000 to \$9,800. And, the interest apparently increases from \$3,190 to \$3,390.

In other words, all other elements of the transaction remain the same except that you are apparently paying more interest on less principal. Therefore, it is reasonable to assume that the interest rate must change. This makes perfectly good sense.

But... Does the interest rate really change? No. That is why we have been saying that the amount of interest apparently increases. In fact, we must impute a change in the interest rate, so that we can measure the change in the value of the transaction.

The stated interest rate on the loan doesn't change. As far as the banker is concerned, it is a 10% loan. The loan documents will undoubtedly say so. But your common sense will tell you that you can't decrease the principal by \$200 and increase the interest by \$200, without something happening to the rate.

The best way to express a solution to this problem is to create a concept, which, in this case, is called the True Interest Cost (TIC).

We said to watch out for the black magic. This is why. Calculating a TIC may seem, initially, like a lot of hocus pocus, but it is, in fact, a very powerful method for comparing loans when one has upfront costs and the other does not.

Now that we know what the TIC is, the next question is how to calculate it.

The smart-aleck answer is to say: Look at Appendix A and work backwards. But even the briefest look at Appendix A will indicate just how utterly daunting a task that would be.

To alleviate this problem, we have provided a series of tables in Appendix D. In addition to the tables in Appendix D, the steps for calculating TIC on a calculator are described in Appendix E. But for the purposes of thoroughly illustrating how the TIC method works, we will use the tables in Appendix E in our example.

The tables indicate the TIC for adding different numbers of points to a transaction for various maturities. In other words, the tables show the increase in True Interest Cost for adding from 1% to 10% in upfront costs to loans with interest rates from 5% to 10%, and with terms of 5, 10, 15, 20, 25, 30, 35, and 40 years. We can use Auto Loan A to illustrate how the tables work.

As you recall, Auto Loan A had a five year term, a 10% interest rate and two points, or 2%, in upfront fees.

Table D-6 is for loans with interest rates of 10%. The first column is for loans with five year terms. Line two is for the number of points, which is two. As you can see, according to the table, the answer is 10.78%. This means that the TIC on Auto Loan A is 10.78%.

To be absolutely precise, the TIC on a five-year loan, at a 10% interest rate, with 2% in upfront fees is 10.78%. This means that paying two points on a five year loan at a 10% interest rate is the equivalent of paying an interest rate of 10.78% with no points.

In other words, the two points upfront will cost you the equivalent of a 0.78% increase in your Interest Rate.

Now we can compare the two loans using the TIC method:

Auto Loan A has a TIC of 10.78%.

Auto Loan B has a TIC of 10.75%.

The difference between Auto Loan A and Auto Loan B is 0.03%.

As you can see, the two loans are virtually identical. This is the same conclusion we reached above, using the Present Value method.

Auto Loan A is marginally more expensive, but only by a factor of 0.03%. This number, 0.03%, or three one-hundredths of one percent, is the equivalent of about \$3 a year on the \$10,000 loan. So, as we said above, this is one loan decision that you don't have to make strictly on the economics, because economically speaking, the two loans are a wash.

To be able to financially differentiate two \$10,000 loan offers to a tolerance of less than \$3 a year, is a powerful analytical capability. The TIC method is not only a powerful, but also a highly exact means, of comparing loans with and without upfront fees, or loans where the upfront fees are different.

Comparing the Present Value Method and the True Interest Cost (TIC) Method.

We cannot press on without comparing the Present Value method and the TIC method. This is not just a mental exercise. It does absolutely no good to learn either method without also learning exactly when to use them. They are not interchangeable. Neither should be used 100% of the time. Nor, as you will see, is the decision as to which method to use based on any abstract rule. On the contrary, which comparative method

to use is based entirely on the circumstances of the financial programs to be compared.

In our example above, depending on the method we used, we generated two entirely different kinds of answers. The Present Value method gave us a number which we could compare with the upfront fee.

As you will recall, the loan without the upfront fee has a higher annual debt service payment. So, the Present Value method takes the increase in the annual debt service payment on the loan without the upfront fee and finds the Present Value for each of such increase for each year of the loan, and then totals them. This number can then be compared directly to the dollar amount of the upfront fees to see which is less.

As you will also recall, the Present Value method left us with several options as to the Present Value of the increase in the Annual Payments, depending on which Discount Rate we used. The Present Values had a range of \$27.47. In this particular example, the outcomes were so close that the selection of the Discount Rate actually became critical.

You can see from reviewing Figure 5-B, that by selecting a higher Discount Rate, Auto Loan B becomes the cheaper loan; whereas if a lower Discount Rate is chosen, Auto Loan A, with its \$200 upfront fee, is the cheaper loan.

This is the problem with the Present Value method. The outcome may depend on the selection of the Discount Rate. This is precisely the situation to avoid, if possible.

The TIC method, on the other hand, produces a very exact answer. By using the TIC method, we calculate the TIC for Auto Loan A to be 10.78%, not 10.77% or 10.79%. There is no ambiguity here at all. It is very easy to compare the two auto loans using the TIC method. The TIC for Auto Loan A is 10.78% and the TIC for Auto Loan B is 10.75%. The difference between the two is unmistakably 0.03%; i.e., the TIC on Auto Loan A is 0.03% higher. Auto Loan A is more expensive than Auto Loan B.

In this case, it is very clear that the TIC method is the better method to use. It is easy to see that, in this particular example, at least, the TIC method is more accurate.

But are there instances where the Present Value method is preferable? The answer is yes. And, surprisingly so, in most instances.

As it turns out, the TIC method only works when the loans being compared have the same term. In all other instances, i.e., when you are comparing loans or financial programs with different terms, the Present Value method is the only method which can be used.

Although the TIC method has great accuracy, its use is, unfortunately, limited.

By using one or the other method, however, all financial programs can be compared, especially those which may, or may not, have upfront fees or one-time costs which are added to the cost of the project.

This leads us to a final note.

Please be aware that, as we said at the beginning of this chapter, loans with different upfront fees can, for analytical purposes, simply be considered loans with different principal amounts. By the same token, it must be said that a financing program that produces a total project cost of \$9,800, or \$98,000,000, is exactly the same thing as a \$10,000, or \$100,000,000, financing with a two-point fee upfront.

In other words, as you continue through this book looking at different factors which inflate project costs, you will see that they do so in either of two ways. They will either add to principal or they will affect the annual debt service payment. Points, as you will see in Chapter 11, are simply additions to principal.

So, what this chapter is really all about is converting changes in principal to changes in annual debt service payment, and vice versa, so that they can be compared from one financial program to another.



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Chapter 6

The Annual Payment Method of Evaluating Project Financing

The preceding five chapters have established the groundwork for evaluating alternative options to finance projects for water and wastewater systems. We know what annual payments look like, and what different types of annual payments there are (Chapter 2). We know how to reduce annual payments in different years to a common value by calculating their Present Values (Chapter 3). And, we know how to convert one-time costs to their annual cost equivalents. Now that we have covered the technical matters necessary to financially evaluate water and wastewater projects, we will turn to the methods of analysis, themselves.

There are two principal ways to financially evaluate projects. These are called the Annual Payment Method and the Total Payment Method.

There is absolutely no mystery here, at all. The Annual Payment Method tells you which of the alternative financial programs you are evaluating has the lowest Annual Payment, and the Total Payment Method tells you which financial alternative has the lowest total payments.

Which method you use under any given circumstance does not depend on any formula or set of events or circumstances. Which formula you use is subjective. As you will see, it is entirely up to you and the personal values you bring to the job.

A Matter of Principle.

Financing anything implies taking on debt. When it comes to debt, there seem to be two distinct kinds of people in the world: those who believe in debt, and those who shun debt.

Both views are supported by firm moral arguments.

Those who favor debt believe that one should pay for things over the same period of time that he uses them. Pay as you go, in other words.

Those who shun debt believe that one should simply not be beholden, period.

Both of these positions make eminently good sense. Both clearly lead, however, to two different financial conclusions. And, not unsurprisingly, they both lead to entirely different analyses in evaluating the cost of any project financing.

One thing to keep in mind as you read the next few pages is that this is a book about financing water and wastewater projects. The point is that these types of projects don't usually involve just a few hundred or even a few thousand dollars. They generally involve hundreds of thousands of dollars, at least; and sometimes tens of millions of dollars. In short, they involve real money.

Thus, there is seldom a question as to whether a project will, or will not, be financed. Other than for admittedly costly hook-up charges, homeowners might sit still for a one-time surcharge of a few hundred dollars to pay for an improvement project. But once that number starts to creep over the one thousand dollar mark, ratepayer resistance begins to increase exponentially. Likewise, if the surcharges start coming every other year or so.

So, almost all water and wastewater projects will be financed. The questions which boards and managers must face are -- and here is where the differences in personal philosophy come in: How much should be financed? And, for how long a period of years should it be financed?

Here is where the Pay As You Go people say as much and as long as possible; and the Not Beholden people say as little as possible and for as short a time as possible.

So, as you can see, the argument generally isn't whether to finance. It is how much and how long? These are the issues along which the battle lines form.

Whether you are a Pay As You Go-er, or a Not Beholden-er, you will want to be able to make your point forcefully and to be able to understand all the facts and figures behind the other argument.

This chapter will present the arguments in favor of the Pay As You Go position and the financial analysis which supports that position, which is the Annual Payment Method of evaluating project financing. The next chapter, Chapter 7, will present the argumentation and supporting analysis for the Not Beholden position and the financial analysis which supports that position, which is the Total Payment Method of evaluating project financing.

The Pay As You Go Theory of Project Finance.

The Pay As You Go side of the argument takes the position that the system itself should pay for things it needs over that period of time that it uses such things. The period of time over which something is used is called its "service life."

If you need pencils and paper, you should pay for them out of today's revenues. The reason for this is that the pencils and paper have a very short service life. Basically, they should be used up within days of delivery. It is not wise to pay for something tomorrow which, by then, will be used up and gone. Everyone hates to pay for things they don't have the use of. This is doubly true when it comes to paying for goods and services which have already been used up.

In 1975, the City of New York went bankrupt. In the financial autopsy that was subsequently performed, it was disclosed that the City was financing the purchase of pencils and paper with the proceeds of twenty-year bonds. In other words, they were paying for the pencils and paper, which were going to be completely used up in 1975, over a twenty-year period. This means that as I am writing this page early in 1992, the people of the City of New York still have three more years to go to pay off the pencils and paper that were used seventeen years ago!

These are the types of nightmares which make Not Beholden types out of ordinary citizens.

But, as usual, it is the abuses which make the headlines. Once in a great while, especially before the municipal accounting rule reforms, some issuer would finance something, not over its real service life, but for as long a term as they could get away with.

The overwhelming majority of project financings do not suffer from such abuses. Projects are built, and goods and services are bought and paid for over their actual service lives. That is the philosophy of the true Pay As You Go proponent.

I say the true Pay As You Go person because there are always those who fundamentally don't ever want to pay for anything. These people aren't really Pay As You Go people; they are Never Pay people. They are just like the city officials in New York before 1975.

The true Pay As You Go person is governed by a sense of fairness and looks to the laws of economics to justify his position. The Never Pay people have no position at all, other than they don't want to pay. They have the laws of economics in their favor; but that is all they have.

The Never Pay person will advocate a five-, seven-, or ten-year auto loan, for example, utterly indifferent to the fact that the vehicle may only be used for three years; and that ratepayers or taxpayers four years hence will have to pay for two cars, the one they just bought and the one they no longer have.

As we said, however, the true Pay As You Go person's position is rooted in real principle. And that principle is that payment should follow use or enjoyment.

In addition to this principle, which is a logical principle, there is also the principle of fairness. Suffice it to say that the principle is rooted in the same facts as is the service life argument. The service life argument holds that a project should be paid for over the period of time in which it is used. The fairness argument holds that the ratepayers who get the benefit of the project (in every year over the project's entire service life) should pay pro rata for such benefits, over each year of the project's service life.

In other words, if a standpipe will last twenty years, the ratepayers in year one will get 1/20th of the benefit, and the ratepayers in year twenty will also get 1/20th of the benefit. Fairness dictates that each group of ratepayers pay their 1/20th of the total project cost. To do otherwise would simply not be fair.

(As you can see, the fairness argument not only supports the Pay As You Go theory, but it also supports the Level Payment Method of annual debt service payment, as well.)

In summary, the Pay As You Go theory of project funding says that a water project should be financed over the period of time during which its use will benefit the system's ratepayers. The theory is rooted both in logic and in fairness. As such, it is, by far, one of the most widely used principles in project finance.

When it comes to financing water or wastewater projects, the principle of Pay As You Go, or payment following use, begets two derivative principles:

- 1.) The term of the loan will coincide with the service life of the project; and,
- 2.) The proper way to evaluate the project is with the Annual Payment Method.

The principle that the term of the loan should coincide with the service life of the project simply means that the system should borrow for no longer a period of time than it will use whatever it is financing.

If a system is financing a car or truck, which management expects will have to be sold or traded in three years' time, then it should pay off any loan used to buy the truck over a three-year period. If a system is buying pumps or other heavy equipment, which it does not expect to have to replace for ten years, then it should pay off any loan taken out to buy such equipment over a ten-year period, as well.

This principle is simple enough, but it does have two drawbacks. The first drawback becomes apparent when you consider land, which has an infinite service life, or such things as mains or standpipes, which have extraordinarily long service lives. In such cases, loans which coincide with service life are impossible to obtain, or simply don't exist.

A loan with an infinite term is, by definition, not paid off. There is no such thing. As a matter of fact, when it comes to commercial banking, loans of more than twenty years are virtually impossible to obtain, and even 15 to 20 year loan terms are extremely rare. Large institutions, such as life insurance companies and pension funds, will make some loans of up to thirty years. And, about the only lender in the marketplace which will go out beyond thirty years is the Farmers Home Administration, which will lend for up to forty years. So, there is simply no one to go to, at all, for a loan of longer than forty years.

This is nothing peculiar to the water and wastewater industry. Private homes certainly have useful lives of longer than thirty years, yet a thirty-year mortgage is the longest term available on a home.

The conclusion, here, is that service life is not the only consideration. The financing term available under any particular set of circumstances is also critical. Thus, if a system is installing a quarter of a mile of new mains, which have a service life of one hundred years or more, and the maximum financing term available is forty years, then, obviously, the forty-year term controls.

This is often the case with shorter term assets as well. For example, a system might well take out a simple bank loan to pay for a new service vehicle with a realistic, and intended, service life of five years.

Nonetheless, the bank may be unwilling to lend for more than a three-year term. This is because the bank always wants the value of the collateral to, theoretically at least, substantially exceed the outstanding principal value of the loan. Thus, if a new vehicle costs \$21,000, and the bank makes the system a Level Principal Payment Loan for a three-year term, just before the last payment is due the outstanding principal balance on the loan will be \$7,000. If the system defaults at this time and the bank actually has to repossess the vehicle, the bank's assumption is that, since the vehicle should have two more years of service life to go, it should be able to get its \$7,000 back when the vehicle is resold.

Those readers who are familiar with such matters as the cost of used equipment, may find the above scenario dubious. It is dubious. A three-year-old vehicle with an original purchase price of \$21,000 may not really be able to bring \$7,000, especially on a distressed sale where all the bidders know the bank wants desperately to get rid of the vehicle. That is why the word "theoretically" is underlined in the above paragraph.

On a straight line depreciation basis (which, of course, has little or nothing to do with reality), after three years a \$21,000 vehicle with a five-year service life should still have a value of 2/5ths of its original value, or \$8,400. So, on paper at least, the bank is in good shape. In the unlikely event the bank actually has to repossess the vehicle and auction it off, of course, it is likely to have at least some loss. But, then, the possibility of a water system defaulting on a loan for a truly needed service vehicle is also an "unlikely event." As a matter of fact, it is a highly unlikely event.

In any case, not only must you consider the actual service life of the asset to be financed, but also the term which any financial institution will allow on such asset.

Now, having discussed why assets should be financed over their service life, let us turn to the method of analyzing such financings.

The Annual Payment Method.

There are two variations for analyzing project financing costs by the Annual Payment Method. Which variation is used in any particular instance depends on whether the loan in question is a Level Principal Payment Loan or a Level Payment Loan. We will begin by comparing two Level Principal Payment Loans using the Annual Payment Method.

Comparing Level Principal Payment Loans by the Annual Payment Method.

Banker A offers your system a \$20,000 Level Principal Payment Loan with a five-year term at a rate of 8.25% with no points.

Banker B offers your system a \$20,000 Level Principal Payment Loan with a five-year term at a rate of 8%, with one point up front.

The problem here is cabbages and kings. As you can see, it is easy to figure out the first year's annual debt service payment on each loan. For Loan B, the first year's annual debt service payment is \$5,600, composed of \$4,000 of principal and \$1,600 of interest. For Loan A, the first year's annual debt service payment is \$5,650, composed of \$4,000 of principal and \$1,650 of interest.

Thus, on an annual basis, Loan B seems \$50 cheaper.

The problem, of course, arises from the "one point" which is charged on Loan B.

As you know, one point equals 1%. This 1%, which is paid to the bank at the closing, has the effect of reducing the actual amount of the loan. In other words, 1% of \$20,000 equals \$200. This amount must be deducted from the principal amount of the loan. In other words, you are borrowing (and therefore must repay) \$20,000, but you are only receiving \$19,800. (This is the scenario alluded to in the section on "Principal" in Chapter 2, where you actually wind up paying back more than you receive.)

In order to accurately compare the two loans using the Annual Payment Method, we must convert our cabbages and kings to either all cabbages or all kings.

It is always easier to convert from the smaller to the larger. Hence, we will begin by determining, by percentage, how much larger Loan A is than Loan B. We can do this simply by dividing Loan A by Loan B, as follows:

$$\frac{20,000}{19,800}$$

The answer is 1.0101 etc. In other words, we can now make Loan B equivalent to Loan A by multiplying Loan B by 1.0101 etc., as follows: $19,800 \times 1.0101 = 20,000$.

Now, here comes the important part. We can also make the annual payments equivalent by multiplying the annual debt service payment on Loan B by 1.0101, as follows:

$$5,600 \times 1.0101 = 5,657$$

Now, the equivalent annual debt service payment for Loan B is \$5,657 and the equivalent annual debt service payment for Loan A is \$5,650.

Thus, in comparing Loan A and Loan B by the Annual Payment Method, Loan B is more expensive.

Now, let us compare the same loans, but this time using the Level Payment Method.

Comparing Level Payment Loans by the Annual Payment Method.

Comparing Level Payment Loans by the Annual Payment Method involves a determination of True Interest Cost, as was described in Chapter 5. Here, we will be able to compare our two loans by calculating the TIC for both.

Therefore, let us say Loan A-1 is a five year Level Payment Loan of \$20,000 at an interest rate of 8.25%, with no points.

Loan B-1 is a five-year Level Payment Loan of \$20,000 at an interest rate of 8%, with one point.

Now, it is possible to calculate the TIC by using the calculator steps as described in Appendix A or the tables in Appendix B, but this would be a torturous process, indeed. The easiest method would be simply to consult the TIC tables in Appendix E.

As you know, the TIC for Loan A-1 is 8.25%. This is because the proceeds of Loan A-1 are the full \$20,000, or 100% of the loan amount.

For Loan B-1, however, the proceeds are only \$19,800, which is 99% of the loan amount. Thus, the proceeds are 1% less than the loan amount.

As you recall from Chapter 5, to determine TIC we must first determine how much we must pay out of, or deduct from, loan proceeds, as a percentage of the loan amount. We have already determined that this is 1%. Therefore, we turn to Appendix D and look for the table

which corresponds to the interest rate on the loan, or 8%. As you can see, this is Appendix D-4. Now, we look for the line which corresponds to the percentage by which the loan amount has been reduced (1%). Finally, we look for the column which corresponds for the loan term (5 years).

The point at which the line and the column intersect is the addition to the loan interest rate. As you can see from Table D-4, the number is: .38. This means that to ascertain the TIC you must add .38 to the loan interest rate of 8.00%. The TIC for Loan B-1 is, therefore, 8.38%.

We can now compare. The TIC for Loan A-1 is 8.25%. The TIC for Loan B-1 is 8.38%. Therefore, Loan B-1 is more expensive than Loan A-1.

This is how Level Payment Loans are compared by the Annual Payment Method.

Now, three final points; but they are brief.

For those readers who are comfortable with using calculators, the steps for ascertaining TIC are set forth in Appendix E.

In addition, there may be a question in some readers' minds as to why the quite simple method of comparison which is used with Level Principal Payment Loans cannot simply be used with Level Payment Loans, as well.

The answer is that to do so produces a slight inaccuracy; and, I emphasize slight. This is caused by the fact that different amounts of principal are repaid at different rates of interest, and the two do not correlate.

Now, just to demonstrate that the two methodologies are, indeed, similar, let us run through the exercise very briefly.

We can determine the annual debt service payment on Loan A-1 by using the calculator steps described in Appendix B, or by consulting the tables in Appendix C. The annual debt service payment on Loan A-1 is \$5,042. For Loan B-1, the annual debt service payment is \$5,009.

Since we have ascertained that Loan A-1 is 1.0101 times larger than Loan B-1, we can multiply the annual debt service payment on Loan B-1 by 1.0101, which equals \$5,060 and compare them.

As you can see, at \$5,060, Loan B-1 is more expensive than Loan A-1 at \$5,042.

Now, for the third and final point, let us look at all four loans (A, A-1, B, and B-1) together.

Comparing Level Payment Loans and Level Payment Loans, Themselves, Using the Annual Payment Method.

As you have seen, the equivalent annual debt service payments for Loans A and A-1, respectively, are \$5,650 and \$5,042. The equivalent annual debt service payment on Loans B and B-1, respectively are \$5,657 and \$5,060.

The point here is that Loans A and A-1 are identical except for one factor. And, Loans B and B-1 are identical except for one factor. That one factor is that Loans A and B are level Principal Payment Loans. Loans A-1 and B-1 are Level Payment Loans.

Please note that the annual debt service payments are higher for the Level Principal Payment Loans than for the Level Payment Loans. In fact, what we have here is a general rule: the annual debt service payments for identical loans is always higher for Level Principal Payment Loans.

This means, of course, that from the point of view of this chapter, which is the Annual Payment Method, it is always preferable to have Level Payment Loans since their annual payments are always lower.

Chapter 7

The Total Payment Method of Evaluating Project Financing

At the beginning of the last chapter, we pointed out that there are two distinct personal philosophies about how to pay for projects. These can be characterized at the Pay As You Go philosophy which holds that financing is proper, as long as the period of financing is confined to the service life of the project. In other words, if a new standpipe will last for twenty years without a major overhaul, then it is perfectly proper to issue a twenty-year bond or take out a twenty-year loan to pay for it.

The contrasting philosophy is known as the Not Beholden theory. Believers in the Not Beholden theory do not believe in debt, at all. And, if it is absolutely necessary to incur debt, then it should be for the smallest amount of money and for the shortest period of time.

We also noted that if one were an adherent of the Pay As You Go philosophy, the appropriate form of analysis of project financings would be with the Annual Payment Method, which was also described in the last chapter.

The opposite side of the coin, of course, is that if one is an adherent of the Not Beholden philosophy, then the appropriate form of analysis of project financings would be with the Total Payment Method, which we will now describe.

* * * * *

In the previous chapter, we also reviewed all of the philosophical reasons in favor of the Pay As You Go Method. We will now review the principles which underpin the Not Beholden theory, as well.

The Not-Beholden Theory of Project Funding.

The philosophical root of the Not Beholden theory of project funding is quite simple: aversion to debt.

Those who abhor indebtedness usually cannot be persuaded otherwise. The payment-according-to-service-life argument is not persuasive. Nor is the fairness argument: that today's ratepayers would be subsidizing future ratepayers.

Paying for a project according to its service life is eminently logical. To do otherwise is illogical.

Having ratepayers pay equally, each year, for their pro rata share of a project, for as many years as the project lasts, is eminently fair. To do otherwise is patently unfair.

Proponents of the Not Beholden theory have no response to these charges of illogic and unfairness. Nonetheless, most people in the world are Not Beholden types.

This is undoubtedly because there is a primal instinct to own. Ownership means control. As long as you have a mortgage, there is a nagging feeling at the bottom of your soul that your home is really not your own: it is the bank's. When people pay off their mortgages they feel a great relief. This feeling is not just confined to mortals. I am told that even professors of economics, who surely must realize that paying off a mortgage is clearly an unwise move from the economic point of view, have this same feeling of freedom and relief on the day they burn their mortgage.

Even the expression "burning the mortgage," has an atavistic and primal ring to it; as if it were some ancient, holy ritual, like the sacrifices in the Old Testament.

In any event, notwithstanding either the laws of economics or the laws of metaphysics, most people loathe debt.

The problem with water and wastewater systems is the same one confronting householders: major projects, such as installing a mile of water mains or buying a new home, simply cost too much money. Nobody can pay in cash. Virtually everyone must finance.

Bearing this in mind, the Not Beholden types will opt for the financing program which lets them pay off the loan as soon as possible.

In some case, people will try to pay off mortgages so fast, which, in turn, eats up so much of their income, that it actually causes great hardship to their families.

Suffice it to say that the Not Beholden theory of debt requires that loans be paid off as quickly as possible.

This leads us to the actual topic of this chapter. Not Beholden types should favor Level Principal Payment loans, because, as you know, they repay principal faster than Level Payment Loans. The Not Beholden types will also certainly want to consider shorter terms - terms which are shorter than service life - even with Level Payment Loans.

These two types of financial structures - Level Principal Payment Loans and the comparison of Level Payment Loans with different terms - require the Total Payment Method of analysis.

The Total Payment Method.

The Total Payment Method involves ascertaining the cheapest possible way to pay for something. Period.

It contrasts with the Annual Payment Method which seeks the most painless way to pay for something. In short, with the Annual Payment Method you trade off lower yearly costs for higher total costs. With the Total Payment Method we are seeking the lowest total cost regardless of annual cost.

Unlike the Annual Payment Method which involved two different techniques to compare loans, the Total Payment Method involves only one. The key to the Total Payment Method is to determine the Present Values of each annual debt service payment of each loan.

In the last chapter, where we looked at the Annual Payment Method, we used two loans, in both the Level Payment format and the Level Principal Payment format, as illustrative examples. In this chapter, we will use the same two loans. And, we will begin, as we did in the last chapter, with the Level Principal Payment Method.

Comparing Level Principal Payment Loans Using the Total Payment Method.

Please recall that Loan A was a \$20,000 Level Principal Payment Loan for a five year term with an interest rate of 8.25% and with no points.

Loan B was a \$20,000 Level Principal Payment Loan for a five year term with an interest rate of 8% but with one point.

Now, as we said above, the key to the Total Payment Method is to determine the Present Value of the annual debt service payment for each year of the loan. To calculate a Present Value, we must discount. And, to discount, we need a Discount Rate.

In Chapter 5, we used a Reinvestment Rate of 7% as the Discount Rate. We will use the same 7% rate in this example for the same reasons.

Below, in Figure 7-A, are the Present Values for the respective annual debt service payments for Loan A.

Figure 7-A

Year	Annual Payment	Present Value
1	\$5,650	\$5,280
2	5,320	4,647
3	4,990	4,073
4	4,660	3,555
5	4,330	<u>3,087</u>
		\$20,642

Now, on the next page, in Figure 7-B are the Present Values for the respective annual debt service payments for Loan B.

Figure 7-B

Year	Annual Payment	Present Value
1	\$5,600	\$5,234
2	5,280	4,612
3	4,960	4,048
4	4,640	3,540
5	4,320	3,080

STOP! What is wrong with the annual debt service payment structure for Loan B? We did not bother to add up the Present Values for the annual debt service payments because, as they are, they would be wrong. What is missing?

The point. The one point fee that was paid to the bank at the closing. That fee was surely a real payment. It was a cash outflow. And, to get an accurate valuation on the loan we must take into account all of the payments, not just the five annual payments. Here, in Figure 7-C, below, is precisely how we do so.

Figure 7-C

Year	Annual Payment	Present Value
0	\$200	\$200
1	5,600	5,234
2	5,280	4,612
3	4,960	4,048
4	4,640	3,540
5	4,320	<u>3,080</u>
		\$20,714

Now, we have the correct Present Value of all of the payments made in respect of Loan B. (N.B. The Present Value of the \$200 payment is \$200 because this sum is paid immediately on closing. Its Present Value is its stated value.)

Now, we are in a position to compare it to Loan A. And, as you can see, by using the Total Payment Method of comparison, we can now conclude that Loan B is more expensive than Loan A. To be precise, it is exactly \$72 more expensive.

Let us move on to Loans A-1 and B-1, which are Level Payment Loans and analyze them using the Total Payment Method.

Comparing Level Payment Loans Using the Total Payment Method.

As you recall, Loan A-1 is the same as Loan A, except that Loan A-1 is a Level Payment Loan. In specific, it is a \$20,000 loan for a five year term at an interest rate of 8.25%, with no points.

Loan B-1 is the same as Loan B, except that it is a Level Payment Loan. In specific, it is a \$20,000 loan for a five year term at an interest rate of 8%, with one point.

Here again, we need to determine the Present Values for each of the annual debt service payments. And, again, we will use a Discount Rate of 7%.

Figure 7-D, below, presents these data for Loan A-1.

Figure 7-D

Year	Annual Payment	Present Value
1	\$5,042	\$4,712
2	"	4,404
3	"	4,116
4	"	3,847
5	"	<u>3,595</u>
		\$20,674

Now, before we present the same data for Loan B-1, we must remember that Loan B-1, like Loan B, above, has the problem of the one point paid to the bank on closing. We will solve this problem in the same way which we did on Loan B, by adding the 1%, or \$200, payment at the very beginning of the loan. Figure 7-E, top of next page, shows these data.

Figure 7-E

Year	Annual Payment	Present Value
0	\$200	\$200
1	5,009	4,681
2	"	4,375
3	"	4,089
4	"	3,821
5	"	<u>3,571</u>
		\$20,737

Having established the Present Value of all of the payments made in respect of Loan B-1, we can now compare it with Loan A-1.

As you can see, Loan B-1 is more expensive than Loan A-1. To be precise, once again, it is \$63 more expensive.

Now, before leaving the Total Payment Method of evaluating project financings, we have one more topic to cover. Earlier in this chapter, we observed that the Total Payment Method was especially valuable in evaluating Level Payment Loans with different terms. We will now illustrate how this works; but, to do so we will need to hypothesize a third loan with a different term than the two loans we have used above.

Comparing Level Payment Loans With Different Terms Using the Total Payment Method.

Let us now create Loan A-2, which will be similar to Loan A-1, except that the term will be six years instead of five and the interest rate will be 8%, instead of 8.25%.

In other words, Loan A-1 was a \$20,000 loan at an interest rate of 8.25% with a term of five years.

Loan A-2 is a \$20,000 loan at an interest rate of 8% with a term of six years.

The Present Value data for Loan A-1 is shown above in Figure 7-D.

The Present Value data for Loan A-2 is shown below, in Figure 7-F, using 7%, once again, as a Discount Rate.

Figure 7-F

Year	Annual Payment	Present Value
1	\$4,326	\$4,043
2	"	3,778
3	"	3,531
4	"	3,300
5	"	<u>3,084</u>
		\$17,736

As you can clearly see, Loan A-2 is considerably less expensive than Loan A-1. To be precise, it is \$2,938 less expensive.

Section II



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Chapter 8

Factors Which Inflate Project Cost

The last seven chapters of this book, which constitute Section One, defined many of the terms which need to be understood in order to be able to fathom various financing programs available to water and wastewater systems. In addition, the two most important tools used to analyze capital project funding were also presented. These are: the methods of comparing costs, and the methods for converting onetime dollar costs or annual dollar costs to rates, and vice versa. Finally, the two most common methods of comparing different financing programs - the annual cost method and the total cost method - were also presented. In short, Section One is designed to give the reader the tools he needs to understand how various categories of project cost can impact the rates of his water or wastewater system.

Section Two will now present specific categories of cost which serve to inflate project costs and, hence, ratepayers' rates.

This chapter is going to introduce the seven factors which serve to inflate the cost of water and wastewater projects. The individual factors themselves will be examined in detail, one each in the next seven chapters of this book. These seven factors are:

- 1.) Term. The number of years, or Period of years, over which the Principal amount of a loan is repaid.
- 2.) Rate. The Interest Rate at which either the bond is issued or the loan is made.

- 3.) Financing Costs. Upfront costs which must be added to the bond or loan Principal as well as annual charges which serve to increase the True Interest Cost.
- 4.) Delay. The effect of delay on both project cost and on financing cost.
- 5.) Imposed Costs. These costs are those additional charges which are extrinsic to the project but are required by a particular financial alternative.
- 6.) Ineligibility. That portion of total project cost which cannot be financed through a particular financing program.
- 7.) Coverage. The amount, if any, by which the ratepayers' annual payments must exceed the annual debt service due.

These cost factors fall into four broad categories. The first five factors relate directly to the discussions of "Upfront costs vs. Annual Cost" in Chapter 5. The first two factors, Term and Rate, have a direct impact on the annual cost of a project; whereas the next three factors, Financing Costs, Delay and Imposed Costs relate directly to upfront costs. In other words, Financing Costs are, generally, upfront costs. They result in an increase in the amount to be borrowed or an increase in loan Principal. Delay results in a higher project cost, which also results in an increase in the loan Principal which system's must borrow. Imposed Costs are also additions to loan Principal.

These five factors are quite straightforward in their impact on the cost of a project to a water or wastewater system. The last two factors, Ineligibility and Coverage, have, however, a far more insidious effect. They are also very difficult to categorize.

Ineligibility, as you will see, means that the particular financial program you have chosen to fund your system's project will not permit certain categories of costs to be included. The implications of this, at first, can be quite subtle; but they can sometimes be quite dire.

But, in addition, they are difficult to define. Ineligible costs do not add to project costs. (They most often subtract costs.) They are not upfront costs and they are certainly not annual costs. But rather, in effect, they create a second project, at least from a financial perspective. Let us look at a brief, theoretical example.

Let us say, for example, that two years ago your system was offered an extensive piece of property, at an extremely attractive price, on which to drill a series of new wells. In addition to the land that was absolutely necessary, the system's board decided to buy a considerable amount of surrounding acreage. They felt this was the most prudent course of action. On the one hand, the additional acreage might be needed for future wells, if the system's needs expanded. But, on the other hand, even if the system didn't need any further wells, the additional acreage would assure good wellhead protection for the original well field. So the board went ahead and bought the property and financed it with a short-term bank loan, on which they only had to make quarterly interest payments.

The board's intention was to roll the acquisition of the land into a much larger project which would involve drilling the new wells, adding new storage capacity and pumping capacity, as well as connecting the new well field to the system itself. They have now completed all the planning and the engineering studies as well as the design of the new improvements. They are now ready to finance the project.

Unfortunately, the board now learns that most of the land cannot be financed through the program they have chosen. That program allows the system to pay for the project over a twenty-year period, but it will only permit land costs to be included in the project to the extent of the minimum acreage required for the wells themselves. In other words, no credit will be given for wellhead protection, and no credit will be given for future expansion.

At first this does not sound so drastic. After all, they already have interim bank financing. So what if it cannot be financed through the program the board had chosen. How hard can it be to get additional financing for the extra acreage?

Well, consider this. The bank might have been very happy indeed, to give you an interest-only bridge loan for a couple of years on the land. They did so in anticipation that the loan would be repaid in its entirety in a year or so when the full project was financed. Now the bank finds out that most of the land will not be financed with the project. Now they are being asked to finance it. And, what is worse, they won't even have a first mortgage on the full property, since part of the mortgage must be split off as security for the part of the land that is being financed through the other program.

The bank decides it won't give you a loan on the excess acreage for more than five years and at a very substantial rate. As you will see in Chapter 9, reducing an amortization schedule from 20 years to five years

can have a drastic effect on the Annual Payments which the ratepayers must make. This is to say nothing of the effect of the increased rate, which will be covered in Chapter 10.

It is important to note that whenever you see the concept "Eligible Project Costs" in literature describing a financing program, you must be aware that it has a hidden counterpart called "Ineligible Project Costs." These ineligible costs still have to be paid for, even if they cannot be financed through a particular program.

The point here is that the ineligibility of a project cost means that the particular cost must be paid for by some other means. Perhaps, such costs can be paid for by another financial program. Perhaps, a bank will finance them. Perhaps, no one will finance them and they must eventually be absorbed directly by the ratepayers in the form of a one-time assessment.

The effects of an ineligible project cost on your system may be quite mild, especially if the cost is small and there is a reasonable alternative readily available. But, on the other hand, if the ineligible cost is large and there is no alternative available, you might wind up with some angry ratepayers who are forced to come up with a large sum of money on a one-time basis.

You can easily see what the real-world effects on ineligible costs may be. The question remains, however, as to how these costs can be measured and how they can be integrated into a total comparison for several financial programs. In other words, let us say in Program A, the land costs described above might be eligible; in Program B, however, they might be ineligible. In order to be able to compare Programs A and B, we would have to deem that Program B is really two programs: Program B1 and Program B2. Program B1 would contain all of the eligible costs, and Program B2 would contain all of the ineligible costs.

If the costs in Program B2 could be financed, then the annual payments in respect thereof could simply be reduced to Present Values and added to the Present Value of the annual payments in Program B1. In such case Programs B1 and B2 would contain the identical costs as Program A. Once all annual payments were reduced to their Present Values, they could be readily compared.

So, it is important to realize that ineligibility does not directly relate to either upfront costs nor annual costs. Rather, ineligible costs create a separate problem which must be dealt with by creating a subprogram. Ineligible costs must be treated separately. But, they can then be converted to Present Values, which can be added back to the original

project costs. In such case, you will then be able to compare programs where the eligible (and ineligible) costs differ.

The seventh and last of the factors which inflate project cost is "coverage," which will be considered in Chapter 15.

The concept of coverage creates a unique type of cost for water and wastewater systems. At first look, the concept of coverage seems to involve a new type of annual cost. But, in fact, it is not a cost at all; it is simply additional funds which are collected from the ratepayers but not paid out in respect of any project.

Thus as far as the ratepayers are concerned, the concept of coverage means more money they will have to pay to their system in respect of a project; but the system will not pass along any of such excess payments to any lender.

As you will see, the concept of coverage, as an additional form of cost, simply refers to the fact that a system must collect a certain percentage more from its ratepayers than it needs for its annual debt service payments. The purpose of this overcollection is that such additional funds constitute additional security for the lender. In other words, if a bank were the lender, the bank might well set, as a condition of the loan, that cash available for debt service be at least 125% of annual debt service. This means that the system must collect 25% more than it needs from its ratepayers to pay for the project. Lenders make such demands in order to make sure that systems will have more than enough funds to make their debt service payments.

Lenders are not at all happy when the cash available for debt service of a water or wastewater system to which they were lending a substantial sum of money is only 100% or 101% of annual debt service. The obvious reason is that any slight slip up in the collection of system revenues will result in a shortfall on the loan repayment. For that reason, lenders often require that systems charge their ratepayers enough to create a cushion, which might be as high as 25% of cash available for debt service.

Now, it is important to note that nothing happens to the additional 25%. The system does not pay it to the lender, or to anyone else. The funds stay right there in the system and can be used for discretionary payments or for other small capital projects. In other words, although the system is required by the lender to collect 125% of annual debt service, the lender does not get the money.

For this reason -- that the extra money is not used to make annual debt service payments for the project -- it cannot be considered an annual project cost. But it certainly has the same effect on the

ratepayers as an additional annual project cost. They must pay more, because of the project, regardless of where the money is actually going.

So, the concept of coverage is, indeed, a subtle form of cost. Though neither an upfront project cost nor an annual project cost nor even a real project cost, at all; it, nonetheless, requires higher annual payments from ratepayers. Thus, it is not a cost to the system, yet it is a cost to the ratepayers in the truest sense of the word.

Chapter 9

Term

The Impact of Term on Annual Debt Service Payments.

Of all the factors which inflate project costs, term is the one which is least understood. Term has an enormous impact on the annual payment.

What is the actual impact of term on annual debt service payments? As you will see in the next few pages, just this: the longer the term, the lower the annual debt service payment. And, the lower the rate of interest, the more so this is true.

Before we look into the impact of term on annual payment, however, let us make sure we are all speaking the same language.

Definitions: Term, Maturity, Amortization, and Amortization Schedule.

Term is the number of years in a loan during which principal is outstanding. Term is the most important concept relating to principal.

Another word which is also used to refer to principal is: maturity. Maturity is the time at which an installment of principal, including the final installment, is repaid. As you will note, a loan can have many maturities, but only one term. In common parlance, the word "maturity" is often used instead of the word "term." In such cases, the speaker is actually referring to the final maturity, which is, of course, synonymous with the term.

There is another word which relates both to time and to principal which is also used in conjunction with loans. This word is "amortization." Amortization is the process of repaying principal. The word "amortization" contains the element "mort," as in mortal, mortality, or mortuary. The root "mort" refers to death; and in the word "amortization," it is actually referring to the "death" of the debt. As principal is being repaid, the obligation is dying. Hence, the process of reducing the obligation is called: amortization.

Finally, there is also the phrase "amortization schedule." The amortization schedule is a list of maturity dates and amounts of principal actually due and payable on those respective dates.

Graphic presentations of loan terms.

Now, when you think of loans, try to picture them on a graph such as the one in Figure 9-A, as follows:

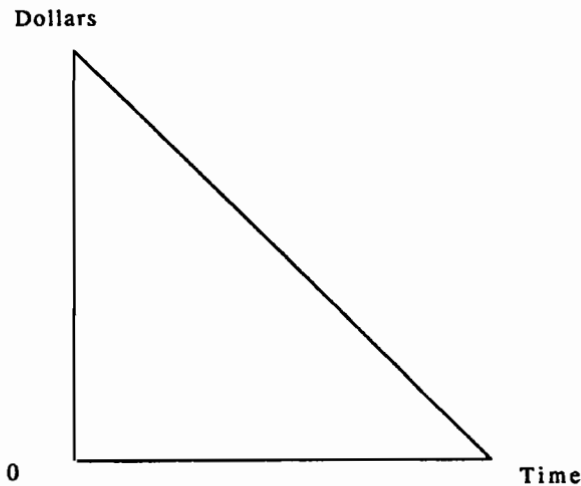


Figure 9-A

Think of the amount of outstanding principal as the number on the vertical, or y-axis. Then think of the amount of time during which principal is outstanding as the horizontal, or x-axis. Figure 9-B, below,

shows a \$100,000 loan for five years which is to be repaid at a rate of \$20,000 per year plus interest.

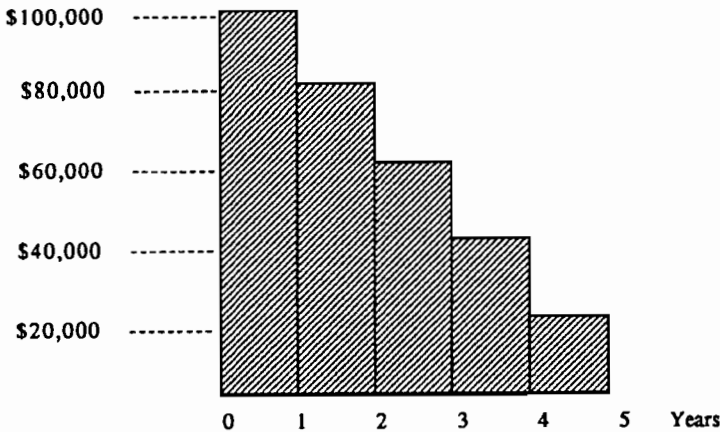


Figure 9-B

Along the vertical, or y-axis, you have the outstanding principal balance on the loan. Along the horizontal, or x-axis, you have the time period. So, for example, at the end of year three, the outstanding principal balance on the loan is \$40,000.

There is another way of looking at the loan illustrated in Figure 9-B, above. Look at Figure 9-C, below.

Here, as in Figure 9-B above, the horizontal, or x-axis, represents the number of years during which loan principal is outstanding. But, in figure 9-C, the vertical, or y-axis, now represents the amount of loan principal repaid in each year. Please note that the loan described in both Figure 9-B and Figure 9-C is a Level Principal Payment Loan. (See Chapter 2.)

The number of years over which the principal of a loan is outstanding is, as you know, called the term. The number of years, however, during which the principal is scheduled to be repaid is called the "amortization period." Please note the careful choice of words. At first glance, these two concepts -- term and amortization period -- might seem identical. They are not. They are similar, but not identical; and the difference between them is important.

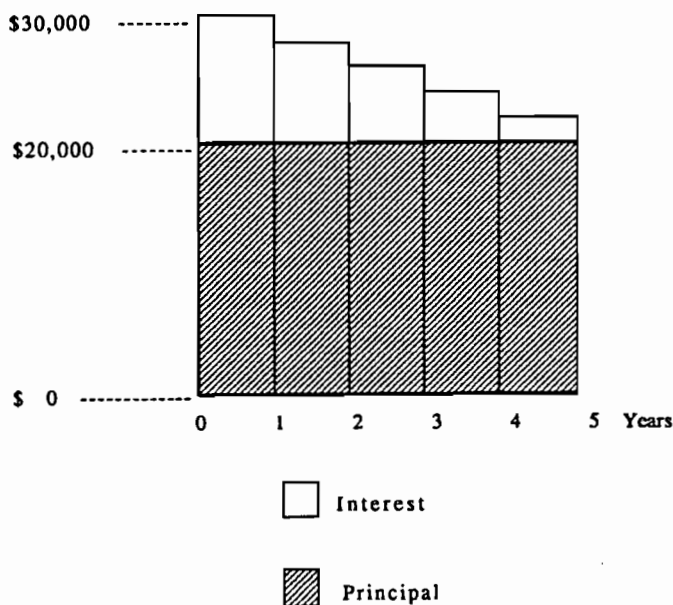


Figure 9-C

First, let us look at a loan where the term and the amortization period are identical. The loan described in Figures 9-B and 9-C, above, is just such a loan. The term is five years and the amortization period is also five years.

"Balloon" Payment Loans.

But there are also many types of loans where the terms and the amortization periods are different. The key to the difference between the two is the phrase "scheduled to be." There are many loans where, for example, the principal is "scheduled to be" repaid over a thirty-year period, but where the final principal payment is made at the end of the tenth year. Loans where the term and the amortization period are different are called "balloon" loans. As you might imagine, the final payment of such loans is called the "balloon payment."

Some people have "balloon" mortgages. You might hear someone say: "I have a thirty-year mortgage with a five-year balloon." This means that the loan has a thirty-year amortization schedule and a five-

year term. What this means to the mortgagor is that the first five annual payments are identical to the first five payments on a thirty-year mortgage. (Remember from Chapter 2: Mortgage loans are level payment loans.) At the end of the fifth year, however, in addition to making annual payment #5, the hapless mortgagor must also pay the entire outstanding principal balance, which is then due and payable.

You might wonder what this poor soul's banker expects him to do at the end of the fifth year. How could anyone be expected to pay off twenty-five years of principal payments at one time? The answer, of course, is that no one expects the mortgage to be paid off at that time. It will simply have to be renegotiated. People often refer to this event as a "rollover." Technically, it is not; nothing is actually rolled over. The old mortgage is actually paid off, and a new mortgage is created. The borrower will have to pay a different rate of interest. He may well have a different term. And the amount of the new loan will be the outstanding principal balance of the old mortgage at the end of year five. The "balloon" becomes the initial principal amount of the new mortgage.

So, there are two types of loans. The first, and by far the most prevalent, are loans where the term and the amortization period are the same. The second, which is used mostly in the commercial real estate market, is the balloon loan where the amortization period exceeds the term. (Please note that there is no such thing as a loan where the term exceeds the amortization period. By definition, once the principal is repaid, there is nothing left upon which to charge interest; the loan is over.)

Figure 9-D presents a graph showing the outstanding balance of a thirty-year mortgage of \$100,000 at a 10% interest rate.

Figure 9-E, below, shows the same loan, but this time the vertical, or y-axis, indicates the amount of principal repaid in each year.

Now, compare the above two figures with the two figures below, which show the same loan but with the added feature of a five-year balloon. In other words, the term is five years but the amortization period is thirty years.

Figure 9-F, below, shows the balloon loan with the outstanding principal balance indicated on the vertical, or y-axis.

As you can see, over 96% of the original principal remains unpaid. Imagine the surprise of the poor, unfortunate mortgagor, who didn't know what a "balloon" was, when he got his last annual payment notice.

Figure 9-G, below, shows the same loan with the amount of the annual principal payment indicated on the vertical, or y-axis.

Dollars

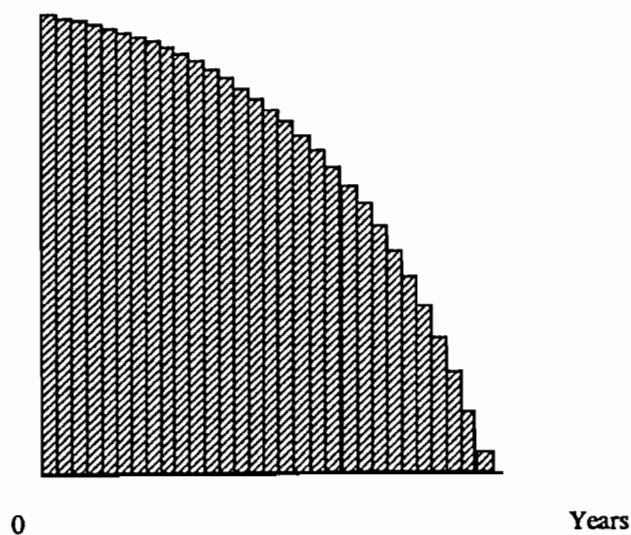


Figure 9-D

Dollars

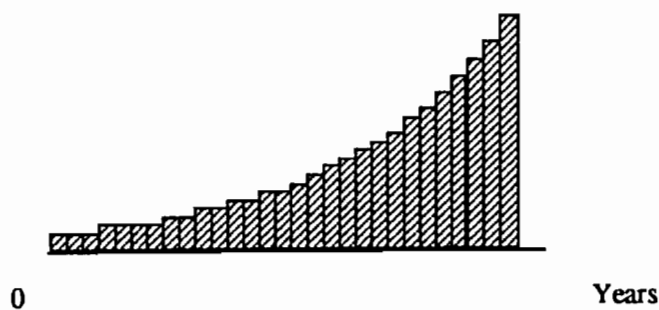


Figure 9-E

Dollars

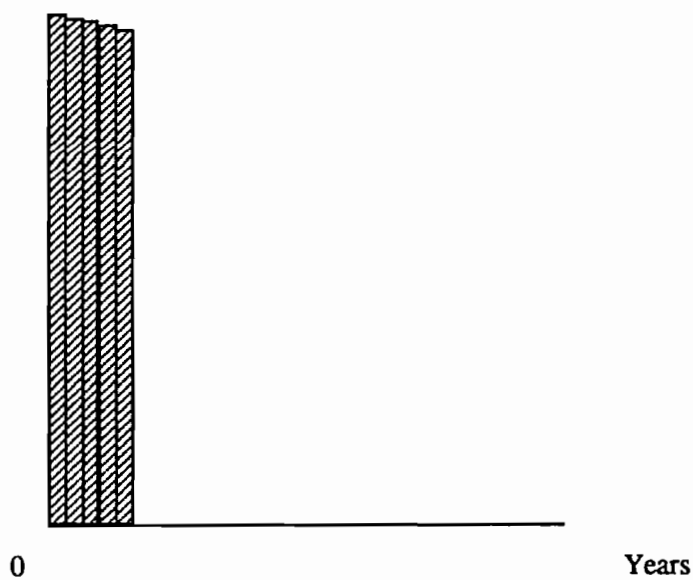


Figure 9-F

Dollars

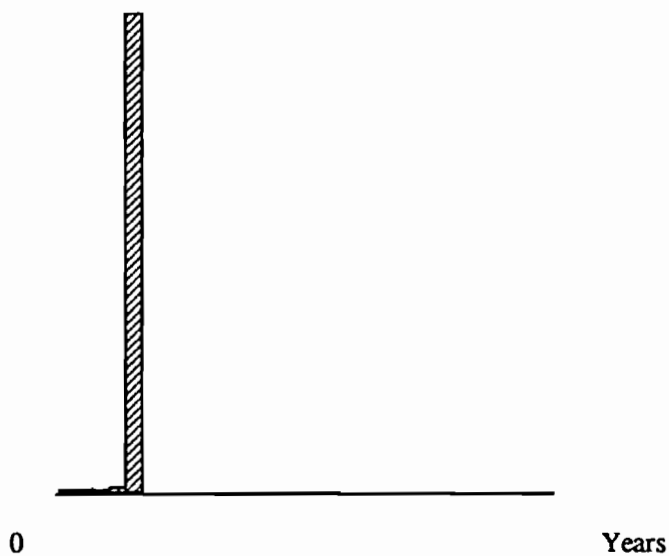


Figure 9-G

The difference between term and amortization period is important. One should not be confused with the other. But from here on in, we are going to assume that we are dealing only with loans where the terms and the amortization periods are the same. Thus, for the balance of this book, when we speak of "term," implicit will be the fact that the loan to which we are referring has an amortization period coterminous with the term of the loan. So, when we speak of extending the term of a loan, say, from ten to twenty years, it will also be implicit that the amortization period is extended for the same period, as well.

* * * * *

The Impact of Term on Annual Debt Service Payment.

We must begin any analysis by saying that the term of a loan has an enormous impact on its annual debt service payment. This is true whether you choose the Level Payment Method or the Level Principal Payment Method.

You may recall that, in Chapter 2, we briefly discussed these two methods of repaying the principal of a loan. These concepts take on great importance when discussing the impact of term on annual debt service payments. As you will see, the impact of term on annual debt service makes the decision of whether to choose a loan with the Level Payment Method or the Level Principal Payment Method a critical judgment. For this reason, we will discuss the impact of term on annual debt service separately for each type of payment method. Then we will compare the two types of loan payment methods in terms of their respective impacts on annual debt service payment.

Characteristics of Level Principal Payment Loans; Problems with Fairness.

If the term of a loan is only one year, then 100% of the principal is due and payable at the end of that year. If the term of a loan is two years, then 100% of the principal must be repaid by the end of the second year.

Let us assume that we are dealing with a Level Principal Payment Loan, so that 50% of the principal balance is due and payable at the end of each year. Then, for a \$100,000 loan at an interest rate of 7%, the annual debt service payment at the end of the first year would be \$57,000, consisting of \$50,000, or 50%, of the principal and \$7,000 of interest, representing 7% on the \$100,000 of principal which was outstanding during the first year of the loan.

The second annual debt service payment, however, which would be due at the end of year two, would only be \$53,500. This payment is composed of \$50,000 of principal, which is the remaining principal outstanding, and \$3,500 of interest, which is 7% of the \$50,000 of principal which was outstanding during the second year of the loan.

So, the annual debt service payment at the end of year one would be \$57,000, and the annual debt service payment at the end of year two would be \$53,500.

The difference between these two payments is only \$3,500, which is about 7%. Even if the amount of the loan were increased from \$100,000 to \$1,000,000, the difference in the two annual debt service payments would be only \$35,000, which is, of course, still only 7%.

A 7% difference in annual debt service payments cannot be considered significant. After all, annual debt service payments only make up a fraction of the total annual service charges to system users. For example, if the operation and maintenance expense for a water or wastewater system were only equal to annual debt service payments, then operation and maintenance expenses would be 50% of total system user charges and annual debt service payments would be 50% of total system user charges. In such case, the 7% difference in the two annual debt service payments in our example, above, would only necessitate a 3.5% difference in total system user charges, since 7% of 50% is equal to 3.5% of 100%.

In our example, the first year's annual debt service payment is \$57,000. If the operation and maintenance expense that year were also \$57,000, then, theoretically, the total system user charge for the year would be \$114,000. Assuming the operation and maintenance expense stayed the same in year two, the second annual debt service payment would be only \$53,500. Total system user charges for the year would be reduced to \$113,500, which is about a 3.5% decrease.

A 3.5% difference in total system user charges from one year to the next is not really significant. Especially when it is a decrease.

When, however, we start talking about loans with terms of more than two years, the story begins to change radically.

Let us use the same \$100,000 loan and the same 7% interest rate, but this time use a 20-year term. Let us look at the difference between the first annual debt service payment and the last annual debt service payment.

Assuming, once again, that we are dealing with a level principal payment loan, the amount of principal which would be repaid in every year would be 1/20th of \$100,000, or \$5,000. For the first year, the outstanding principal balance would be the original principal balance, or \$100,000. The interest on \$100,000 for one year at a rate of 7% would be \$7,000. Since the principal payment at the end of the first year would be \$5,000, and the interest payment would be \$7,000, the total annual debt service payment for year one would be \$12,000.

For year twenty, the outstanding principal balance would only be \$5,000, since the other \$95,000 had been repaid in the preceding 19 years. The interest, at a rate of 7%, on the outstanding principal balance of \$5,000 would be \$350. Therefore, the total annual debt service payment for year twenty would be \$350 of interest and \$5,000 of principal, or \$5,350.

Now, compare the first year's annual debt service payment of \$12,000 with the annual debt service payment in year twenty of \$5,350. Here, the difference in the two annual debt service payments is \$6,650, or a 55% decrease! I am certain that the ratepayers in year 20 would be pleased with this circumstance, but what about the ratepayers in year one who are getting the benefit of the same project?

In Chapter 2, we discussed Level Payment Loans and Level Principal Payment Loans. We observed that one of the key points in favor of Level Payment Loans involved the concept of fairness. But we did not go into the matter in detail. Let us illustrate this point now with an example.

As you will recall, a Level Payment Loan means just that: each annual debt service payment is equal to any other annual debt service payment. If the service life of, say, a new treatment facility is twenty years, then, using our example above of a \$100,000 loan at an interest rate of 7%, the annual debt service payment under the Level Payment Method would be \$9,439. This means that the annual debt service would be \$9,439 in each of the twenty years the loan was outstanding. In such case the total debt service would be twenty times \$9,439 ($20 \times \$9,439$), or \$188,786.

A ratepayer in year one would pay his share of the \$9,439, which is 1/20th of the total project cost. Assuming that the project -- say a new treatment facility -- had a service life of twenty years, that ratepayer

would also enjoy 1/20th, or 5%, of the benefit of the project. In other words, in year one, he would pay 5% of the cost of the project and he would receive 5% of the benefit of the project. Fair enough.

Now, what if the project loan were a Level Principal Payment Loan instead of a Level Payment Loan. Table 9-A, below, sets forth the annual principal payments, the annual interest payments, and the annual debt service payments on a twenty-year, Level Principal Payment Loan of \$100,000 at an interest rate of 7%.

Table 9-A

Year	Annual Principal Payment	Annual Interest Payment	Annual Debt Service Payment	% of Total Debt Service
1	\$5,000	\$7,000	\$12,000	6.9%
2	"	6,650	11,650	6.7%
3	"	6,300	11,300	6.5%
4	"	5,950	10,950	6.3%
5	"	5,600	10,600	6.1%
6	"	5,250	10,250	5.9%
7	"	4,900	9,900	5.7%
8	"	4,550	9,550	5.5%
9	"	4,200	9,200	5.3%
10	"	3,850	8,850	5.1%
11	"	3,500	8,500	4.9%
12	"	3,150	8,150	4.7%
13	"	2,800	7,800	4.5%
14	"	2,450	7,450	4.3%
15	"	2,100	7,100	4.1%
16	"	1,750	6,750	3.9%
17	"	1,400	6,400	3.7%
18	"	1,050	6,050	3.5%
19	"	700	5,700	3.3%
20	"	350	5,350	3.1%
	\$100,000	\$73,500	\$173,500	100%

Please note that the last column in Table 9-A, above, is captioned "Percentage of Total Debt Service." The percentages listed on each line represent the annual debt service payment for that year divided by the total debt service.

As you can see, with the Level Principal Payment Loan, the ratepayer in year one pays 6.9% of the project cost. The problem is that, since the service life of the project is only twenty years, he only gets the benefit of 1/20th, or 5%, of the project. So, he winds up paying for 6.9% of the project but getting the benefit of only 5% of the project.

By the same token, look now at the ratepayer in year twenty. He pays his proportionate share of the annual debt service payment of just \$5,350, which is only 3.1% of total project cost. So, the year twenty ratepayer only pays for 3.1% of the project, but winds up getting the benefit of a full 5% of the project.

Now, 6.9%, 5%, and 3.1% look like pretty small numbers. But, in the next chapter we will discuss how absolute havoc can ensue from the way numbers can be characterized. If you want to characterize the annual debt service payments in years one and twenty, you can see that the difference between 6.9 and 3.1 is 123%. This means that the annual debt service payment in year one is 123% higher than the year twenty annual debt service payment.

Now, the differences between 3.1% and 6.9% are not much; but system ratepayers will certainly want to know why they are being charged 123% more, when they are only getting the same benefit out of the project!

Now, the theme of this chapter concerns the effect of rate on term. Lets look, without going into all of the detail, at the same two loans, if they had 40-year terms instead of twenty-year terms.

On the Level Principal Loan, the annual principal payment on a 40-year, \$100,000 loan would be 1/40th, or 2.5%, or \$2,500. The interest payment would be the same in year one, as for the 20-year loan (since the full \$100,000 is outstanding in the first year), or \$7,000. So, the annual debt service payment in year one for the Level Principal Payment Loan would be \$9,500. For the fortieth year, only \$2,500 would remain outstanding. The interest on this amount, at the 7% rate, would be \$175. So, the fortieth year annual debt service payment would be \$2,675.

The difference between the annual debt service payment in year one can be characterized as being 258% higher than the annual debt service payment in year forty. How do you think your ratepayers would react to those numbers?

As we said before, the characterization of numbers will be discussed more fully in the next chapter. This chapter focuses on the effect of term on annual payment.

Now, that we have reviewed the impact of term on the annual debt service payment of a Level Principal Payment Loan, we will move on to the consideration of the impact of term on the annual debt service payments of a Level Payment Loan.

Calculating Annual Debt Service Payments for Loans Using the Level Payment Method.

The impact of term on annual debt service payments is as significant when the Level Payment Method is used as when the Level Principal Payment Method is used. With the Level Payment Method, however, there is no problem with fairness. There is no problem with an adverse characterization of the numbers.

For nine chapters so far, we have put off the task of calculating annual debt service payments on loans when using the Level Payment Method. We cannot go any further. To determine the impact of term on the annual debt service payments of loans using the Level Payment Method, we must first be able to calculate annual debt service payments themselves on loans using the Level Payment Method. Figure 9-H, below, shows the actual formula for deriving the annual debt service payment on a loan using the Level Payment Method. (Note that when discussing the Level Payment Method, we refer to the annual debt service payment, not payments; since all of the annual debt service payments are the same. The annual debt service payment on a loan using the Level Payment Method is frequently referred to simply as the "level payment.")

Figure 9-H

$$ADSP = P \times \frac{i}{1 - \left[\frac{1}{1+i} \right]^n}$$

In this terribly imposing formula, ADSP is annual debt service payment, P is the original principal amount of the loan, i is the interest rate expressed as a decimal, and n is the term of the loan.

Gratefully, most of us are relieved of the burden of having to deal with this dreadful equation on a daily basis. There are a proliferation of books containing tables of annual debt service payments for Level

Payment Loans. There are also hand-sized, and smaller, calculators which can reduce this daunting host of symbols to four simple keystrokes. If your calculator has the following keys: n, i, PV, and PMT, you will be able to compute any level debt service payment in seconds, just by following the simple instructions in the manual.

Now, however, at the risk of alienating those who relied on the representation at the beginning of this book that it was written for non-financial executives, we will actually use the equation to calculate the level debt service payment. We will then go back and demonstrate, by using simple arithmetic, that the annual debt service payments determined by the formula are correct and that they produce annual debt service payments which are level, or equal. Mercifully, however, we will select a loan with only a two-year term as a means of abating the agony of going through the formula.

Figure 9-I shows how the formula works for a two-year loan of \$100,000 at an interest rate of 7%. Translating into the equation: the original principal, or *P*, is \$100,000, the interest rate, *i*, is 7%, or .07, and the term, or *n*, is 2 years.

Figure 9-I

$$ADSP = 100,000 \times \frac{.07}{1 - \left[\frac{1}{1 + .07} \right]^2}$$

As you will see, the calculation can now be done on an old-fashioned adding machine. The only real difficulty lies in remembering the sequence of operations from high school algebra. The first step is to begin with the bottom, or denominator, of the fraction in the parentheses. This simply involves adding 1.00 and .07, to get 1.07, as is shown in Figure 9-J, below.

Figure 9-J

$$ADSP = 100,000 \times \frac{.07}{1 - \left[\frac{1}{1.07} \right]^2}$$

Step 2 involves elimination of the fraction in the parentheses by dividing the number 1 by 1.07, to obtain .93458, as is shown in Figure 9-K. (Note the reason we are using so many decimal places is that we have a large [\$100,000] loan. The rule of thumb to use is that you should have one less decimal places than you have digits in the original principal amount.)

Figure 9-K

$$\text{ADSP} = 100,000 \times \frac{.07}{1 - (.93458)^2}$$

In Step 3, we eliminate the parentheses by multiplying the number in the parentheses by itself. (The superscript 2 indicates the number of times the number should appear in the multiplication, i.e., .93458 x .93458.) The result is .87344, as shown in Figure 9-L.

Figure 9-L

$$\text{ADSP} = 100,000 \times \frac{.07}{1 - .87344}$$

Step 4 involves the simple subtraction now left in the denominator of the main fraction: $1 - .87344 = .12656$. This is shown in Figure 9-M, below.

Figure 9-M

$$\text{ADSP} = 100,000 \times \frac{.07}{.12656}$$

In Step 5, we eliminate the main fraction by dividing the numerator, .07, by the denominator, .12656, to yield: .55309, as shown in Figure 9-N, below.

Figure 9-N

$$\text{ADSP} = 100,000 \times .55309$$

All that remains in Step 6 is to multiply the original principal amount, or 100,000, by .55309. The result is 55,309, or \$55,309. **This is the annual debt service payment.**

Now, we can put an end to this brief exercise by doing a little arithmetic to prove that \$55,309 is the exact amount of principal and interest due in both years of the loan. We do this by working backwards. We already have \$55,309 which we believe to be the annual debt service payment. We also know that this amount is composed of principal and interest. We first need to determine how much of each: how much of the \$55,309 is interest in the first year, and how much is principal.

We can begin by calculating the amount of interest. We can do this because we know the original principal amount and the rate of interest. Because the entire original principal balance had to be outstanding during the first year, we can calculate the amount of interest due at the end of the first year by multiplying the original principal amount, \$100,000, by the interest rate, 7%, or .07. This is shown in Figure 9-O, below.

Figure 9-O

$$\$100,000 \times .07 = \$7,000$$

Now that we know the amount of interest paid in year one, we can calculate the amount of principal paid in year one by subtracting the amount of interest paid, \$7,000, from the annual debt service payment, \$55,309, to yield \$48,309, as shown in Figure 9-P, below.

Figure 9-P

$$\$55,309 - 7,000 = \$48,309$$

Now that we know how much principal was paid in year one, we can calculate the outstanding principal balance for year two, which can be used to calculate the interest due at the end of year two. We do this by subtracting the principal payment in year one, \$48,309, from the original principal amount, \$100,000, to obtain \$51,691, as shown in Figure 9-Q, below.

Figure 9-Q

$$\$100,000 - \$48,309 = \$51,691$$

Since we now know the outstanding principal balance for year two, we can calculate the amount of interest due in year two by multiplying the outstanding principal balance, \$51,691, by the rate of interest, .07. The result is \$3,618, as shown in Figure 9-R, below.

Figure 9-R

$$\$51,691 \times .07 = \$3,618$$

Now, the crucial part. We know the amount of interest due in year two, \$3,618. We also know the outstanding principal balance for year two, \$51,691. Since year two is the last year of the loan, the outstanding principal balance for year two must also be the amount of principal which must be paid in year two. Therefore, we can calculate the annual debt service payment due in year two simply by adding the amount of interest due in year two to the amount of principal due in year two, as is shown in Figure 9-S, below.

Figure 9-S

$$\$3,618 + 51,691 = \$55,309$$

As you can now see, the formula does work. The number, \$55,309, is the annual debt service payment which we used in year one (Fig. 9-P) and which we calculated for year two (Fig. 9-S); and it is the same number predicted by the infamous formula as shown in Figure 9-N.

So, you can rest assured the formula works. And since it is the formula which is both built into hand-held calculators and the one from which all of the tables are derived, you, who tend to be financial Doubting Thomases, can now also be assured that your calculator and the tables are accurate.

Comparing Changes in Annual Debt Service Payment Caused by Variations in Term; and the Effect of Interest Rates on the Impact of Loan Term on Annual Debt Service Payments.

Let us begin with the point of departure between Level Payment Loans and Level Principal Payment Loans. That is the zero interest rate loan.

The amortization schedule for a zero interest rate loan, regardless of the term, is the same whether using the Level Payment Method or the Level Principal Payment Method. So is the Annual Debt Service Payment.

A Level Principal Payment Loan of \$100,000 with a two-year term at an interest rate of 0% has an annual debt service payment of \$50,000. So does a Level Payment Loan of the same amount for the same term at the same 0% rate of interest.

A Level Payment Loan of \$100,000 with a twenty-year term at an interest rate of 0% has an annual debt service payment of \$5,000. So, does a Level Principal Payment Loan of the same amount for the same term at the same 0% rate of interest.

With the Level Principal Payment Loan, all of the principal payments are equal. With the Level Payment Loan, all of the payments, themselves, are equal. With a zero interest rate loan, all of the annual debt service payments are composed of principal only. There is no interest component. So, here all of the annual debt service payments are equal; and, since they are composed of principal only, all of the principal payments are equal, as well.

The two-year loan has an annual debt service payment of \$50,000, and the twenty-year loan has an annual debt service payment of \$5,000. Here, a difference of 18 years in the principal repayment schedule results in one annual debt service payment's being ten times (10x), or 1,000%, higher than the other.

This is a good example of the impact of term on annual debt service payments.

This example is unique, however. It deals with 0% interest rate loans, which are so rare as to be almost hypothetical. It is also the only instance where the Level Payment Method is identical in effect to the Level Principal Payment Method in terms of annual debt service payment. That, however, is where the similarity between the Level Principal Payment Method and the Level Payment Method ends.

We will now look at the impact of term on the annual debt service payments of both Level Principal Payment Loans and Level Payment Loans where realistic rates of interest are involved. As you will see, the impact is similar on both types of loans, but not identical. This is because, as you know, annual debt service payments on Level Principal Payment Loans decline over the term of the loan. Thus, there are as many different annual debt service payments in a Level Principal Payment Loan as there are years in the loan term. On the other hand,

with Level Payment Loans, the annual debt service payment is a constant over the entire term of the loan.

Level Payment Loans.

With a Level Payment Loan you can measure the impact of term on annual debt service by simply comparing the annual debt service payment of two loans with different terms, where each loan is for the same principal amount and carries the same rate of interest.

With a Level Principal Payment Loan, it is a little more difficult. Since the annual debt service payments on a Level Principal Payment Loan decline every year, the only way to obtain an accurate description of how term really affects annual payment is to compare the annual debt service payments at several intervals over the loan term. Again, we must make sure, when comparing these loans, that the principal amounts and the interest rates are the same for both.

Since they are easier to work with, we will begin by analyzing the impact of term on the annual debt service payments of Level Payment Loans.

We can start by setting out the annual debt service payments for a \$100,000 Level Payment Loan at an interest rate of 7% at various terms ranging from 5 to 30 years. This is shown below on Table 9-B.

Table 9-B

A	B	C
5 years	\$24,389	N/A
10 "	14,238	42%
15 "	10,979	23%
20 "	9,439	14%
25 "	8,581	9%
30 "	8,059	6%

Please direct your attention to Column C, which indicates the percentage difference in annual debt service payment for the respective terms. This is where the impact of term on annual debt service payment really begins to show up.

In the first place, the numbers in Column C read from the bottom up. In other words, referring to the last two lines at the bottom of Column

C, you will note that the difference between the annual debt service for a twenty-five-year loan and a thirty-year loan is 6%. This means that the annual debt service on the thirty-year loan is 6% less than the annual debt service payment on the twenty-five year loan.

(Please note that the numbers in Column C are not cumulative. You cannot find the difference in annual debt service payments between a fifteen-year loan and a five-year loan by adding the percentages in Column C. But, if needed, you can find the difference in annual debt service payments between any two loans by dividing the later loan by the earlier loan, and then subtracting the result from the number 1. For example, the difference in annual debt service between the fifteen-year loan and the five-year loan is $10,979 / 24,389 = .45$; then $1 - .45 = .55$. So, in this case the annual debt service payment on the fifteen-year loan is .55, or 55%, lower than the annual debt service payment on the five-year loan. And so on.

Please also note that we can characterize these numbers differently simply by reversing the way we consider them. For example, we can say that the annual debt service payment declines by 42% when the term of the loan is extended from five to ten years. Using the exact same numbers, but reversing the emphasis, we could also say that annual debt service payments increase by 71% when the term of the loan is reduced from ten to five years. Our overall purpose, however, is to seek out ways of lowering the annual debt service payments which the ratepayers have to make; so it is appropriate for us to emphasize the lowering of rates. Therefore, instead of saying how much rates increase with shorter terms, we will emphasize how much they decrease over the longer terms.)

These differences in annual debt service payments are the most important point to be made about the impact of different loan terms. Just look how great the impact really is!

The difference between a ten- and a thirty-year term means a difference of 43% in annual debt service payments which your ratepayers have to make. ($8,059 / 14,238 = .57$; the $1 - .57 = .43$, or 43%) If you can lower their annual debt service payments by choosing a financial program which permits thirty-year terms over another program which permits only ten-year terms, they should be very happy ratepayers, indeed.

In the same vein, please note that the difference between just a twenty- and a twenty-five-year term means an annual debt service payment reduction of 9%. This is noteworthy because many financial advisors and investment bankers simply recommend twenty-year terms

out of habit. This is because there is little distinction in the bond market between a twenty-year bond and a twenty-five-year bond. But by just making the suggestion that you would prefer a twenty-five-year term, you may be able to effect a substantial reduction in your ratepayers' annual debt service payments.

Finally, please note as well, that the difference between the annual debt service payments on a loan with a fifteen-year term versus a twenty-five-year term is 22%. ($8,581 / 10,979 = .78$; then $1 - .78 = .22$, or 22%) This is noteworthy because fifteen years is often the maximum term which a bank will allow. But by going to the bond market, instead, you may be able to reduce your system's annual debt service payment by 23%. As you will see in the final section of this chapter, below, even if the banker offers you a lower interest rate, you may still achieve the lowest annual debt service payment by going to the bond market. This is because the lower interest rate may not result in an annual debt service payment which is lower than that on the bond with the higher interest rate but longer term. In short, despite a slightly higher interest rate, you might still wind up with a lower annual debt service payment, which is the ultimate goal for your ratepayers.

Now that you have seen how extending the term of a loan reduces its annual debt service payment, you might think that this is the last word the subject. Unfortunately, it is not.

Table 9-B showed you the impact of term on rate; but it did so only at one rate of interest. Unfortunately, the impact of term changes, depending on what rate of interest is used.

To illustrate this point, please look at Table 9-C, below, which presents almost the same data as in Table 9-B. The only difference is that the annual debt service payment on the \$100,000 loan is shown at three rates of interest: 1%, 5%, and 10%, in Columns A, C, and E, respectively.

Table 9-C

Years	A	B	C	D	E	F
	1%		5%		10%	
5	\$20,604	N/A	\$23,099	N/A	\$26,380	N/A
10	10,558	49%	12,950	44%	16,275	38%
15	7,212	32%	9,634	26%	13,147	19%
20	5,542	23%	8,024	17%	11,746	11%
25	4,541	18%	7,095	12%	11,017	6%
30	3,875	15%	6,505	8%	10,608	4%

Again as in Table 9-B, above, Columns B, D, and F are to be read from the bottom up, and they are not cumulative. Hence, the annual debt service payment on a loan with an interest rate of 1% is 15% lower if a thirty-year term is used than if a twenty-five-year term is used.

Now, please compare the numbers in Columns B, D, and F. Note that the higher the interest rate, the smaller are the differences in annual debt service payments.

There are two important points here. First, **the impact of term on annual debt service payment changes depending on the rate of interest.** And, second, the lower the interest rate, the greater the impact of **lengthening term on lowering annual debt service payments.**

Now, let us look at the impact of longer terms on the other type of loans: Level Principal Payment Loans.

Level Principal Payment Loans.

Table 9-D, below, sets forth the various annual debt service payments on a Level Principal Payment Loan of \$100,000, at an interest rate of 7%, with terms ranging from five to thirty years at 5-year intervals.

There is one problem, however. Level Principal Payment Loans, as you know, have different annual debt service payments each year. For our purposes, we can, for the moment, use the first, or initial, annual debt service payment as a basis of comparison. We will deal more fully with the problems this creates at the end of this chapter. For now, we must just remember that the annual debt service payment with which we are dealing is the initial annual debt service payment.

Table 9-D

A	B	C
5 years	\$27,000	N/A
10 "	17,000	37%
15 "	13,667	20%
20 "	12,000	12%
25 "	11,000	8%
30 "	10,333	6%

Again, as in Table 9-B, above, the numbers in Column C read from the bottom up; and they are not cumulative. For example, a thirty-year term results in an initial annual debt service payment which is 6% lower than that of a loan with a twenty-five-year term. And, a twenty-five-year term results in an initial annual debt service payment which is 8% lower than that of a loan with a twenty-year term.

Now, as was the case with Level Payment Loans, as illustrated in Table 9-C, above, the impact of term on Level Principal Payment Loans also changes depending on the rate of interest used.

Table 9-E, below, demonstrates the impact of longer terms on initial annual debt service payment, using the same loan data as in Table 9-D, above, but at rates of interest of 1%, 5%, and 10%.

Table 9-E

Years	A	B	C	D	E	F
	1%		5%		10%	
5	\$21,000	N/A	\$25,000	N/A	\$30,000	N/A
10	11,000	48%	15,000	40%	20,000	33%
15	7,667	30%	11,667	22%	16,667	17%
20	6,000	22%	10,000	14%	15,000	10%
25	5,000	17%	9,000	10%	14,000	7%
30	4,333	13%	8,333	7%	13,333	5%

As you can see by comparing Table 9-E with Table 9-C, the lower the interest rate, the greater the impact of lengthening term on lowering initial annual debt service payments. As you will also note, the impact

appears to be slightly higher for Level Principal Payment Loans than it is for Level Payment Loans. We use the word "appears," because, as you recall, with the Level Principal Payment Loan we have only been looking at initial annual debt service payments, not all of the annual debt service payments.

Let us see if this phenomenon persists beyond the initial annual debt service payment. Let us see if lower interest rates mean a greater impact of term on annual debt service payment.

Table 9-F, presents the same data as in Table 9-E, above; but instead of looking at the initial, or first, annual debt service payment, we are now looking at the fifth annual debt service payment.

Table 9-F

Years	A	B	C	D	E	F
	1%		5%		10%	
5	\$20,200	N/A	\$21,000	N/A	\$22,000	N/A
10	10,600	48%	13,000	38%	16,000	27%
15	7,400	30%	10,333	21%	14,000	12%
20	5,800	22%	9,000	13%	13,000	7%
25	4,840	17%	8,200	9%	12,400	5%
30	4,200	13%	7,667	6%	12,000	3%

Please compare the last two lines of Column F in both Table 9-F and Table 9-E, above.

As you can see in Table 9-F, two annual debt service payments at the bottom of Column F represent decreases of 5% and 3%, respectively. In Table 9-E, the same two data points are 7% and 5%, respectively. Table 9-E represents the first annual debt service payment. Table 9-F represents the fifth annual debt service payment.

From these two tables we can deduce that the effect of interest rates on the impact of term on annual debt service diminishes over time for Level Principal Payment Loans.

We can also go back and compare the data with the comparable data in Table 9-C, above. The two pertinent data points in Table 9-C are 6% and 4%, respectively. Thus, we can see that the Level Payment Loan falls between the first and fifth payment of the Level Principal Payment Loan. So, although the impact of interest rates starts out being greater

for Level Principal Payment Loans, the effect diminishes over time such that the overall impact of interest rates on the impact of term on annual debt service payment is greater for Level Payment Loans than for Level Principal Payment Loans.

Here are some additional tables which confirm our conclusions. Table 9-G presents the same data as appear in Table 9-F, except that the tenth annual debt service payment is used instead of the fifth annual debt service payment, as the basis of comparison.

Table 9-G

Years	A	B	C	D	E	F
	1%		5%		10%	
5	N/A	N/A	N/A	N/A	N/A	N/A
10	\$10,100	N/A	\$10,500	N/A	\$11,000	N/A
15	7,067	30%	8,667	17%	10,667	3%
20	5,550	21%	7,750	11%	10,500	2%
25	4,640	16%	7,200	7%	10,400	1%
30	4,033	13%	6,833	5%	10,333	1%

Table 9-H, below, presents the same data for the fifteenth annual debt service payment.

Table 9-H

Years	A	B	C	D	E	F
	1%		5%		10%	
5	N/A	N/A	N/A	N/A	N/A	N/A
10	N/A	N/A	N/A	N/A	N/A	N/A
15	\$ 6,733	N/A	\$ 7,000	N/A	\$ 7,333	N/A
20	5,300	21%	6,500	7%	8,000	-9%
25	4,440	16%	6,200	5%	8,400	-5%
30	3,867	13%	6,000	3%	8,667	-3%

As you can now see from the last two lines in Column F, instead of annual debt service payments decreasing as the loan term is extended, they are now actually increasing. In specific, and contrary to everything we have seen so far, in year fifteen, the annual debt service payment on a twenty-five-year loan is actually greater than the annual debt service payment on a twenty-year loan!

Table 9-I, below, presents the same data for the twentieth annual debt service payment.

Table 9-I

Years	A	B	C	D	E	F
	1%		5%		10%	
5	N/A	N/A	N/A	N/A	N/A	N/A
10	N/A	N/A	N/A	N/A	N/A	N/A
15	N/A	N/A	N/A	N/A	N/A	N/A
20	\$ 5,050	N/A	\$ 5,250	N/A	\$ 5,500	N/A
25	4,240	16%	5,200	1%	6,400	-16%
30	3,700	13%	5,167	1%	7,000	-9%

Lastly, Table 9-J, presents the same data for the twenty-fifth annual debt service payment.

Table 9-J

Years	A	B	C	D	E	F
	1%		5%		10%	
5	N/A	N/A	N/A	N/A	N/A	N/A
10	N/A	N/A	N/A	N/A	N/A	N/A
15	N/A	N/A	N/A	N/A	N/A	N/A
20	N/A	N/A	N/A	N/A	N/A	N/A
25	\$ 4,040	N/A	\$ 4,200	N/A	\$ 4,400	N/A
30	3,533	13%	4,333	-3%	5,333	-21%

As you can see, the reverse phenomenon, where the annual debt service payments are increasing with the longer terms, is now becoming much more pronounced. It has now reached Column D, meaning that even at an interest rate of only 5%, the twenty-fifth annual payment of a thirty-year Level Principal Payment Loan is actually greater than the twenty-fifth annual debt service payment of a twenty-five-year Level Principal Payment Loan!

* * * * *

Now, what conclusions can be drawn from all of this discussion about term? What is important about loan term, as far as the ratepayers of a water or wastewater district are concerned?

Just this: **the longer the term, the lower the annual debt service payment. And, the lower the interest rate, the more so this is true.**

Most project financings for water and wastewater systems will involve the use of Level Payment Loans. As such, the longer the term, the lower will always be the annual debt service payments which the ratepayers have to make. In addition, as interest rates decline, this factor becomes more important. At lower rates of interest, extending the term of a loan means even lower annual debt service payments.



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Chapter 10

Rates

When it comes to borrowing money, most people think they have made a great deal if they get a low rate. Sometimes they can be very wrong. Here is an example.

You have just bought a new home and you are returning from the closing. You run into a new neighbor who has just bought the house next door, which is relatively comparable to yours. You strike up a conversation about your respective experiences in getting a mortgage. Your new neighbor is pretty happy with himself. He tells you he just got a great deal on his mortgage loan: the bank gave it to him for an interest rate of 8%.

Suddenly, your heart sinks. You know he is going to ask you how you did with your bank. You are now feeling pretty bad because you got a 9% rate on your mortgage.

Now all of a sudden you remember reading Chapter 10 of this book. Your confidence starts to return. You realize that your house and your new neighbor's house are pretty similar so they must have cost about the same amount. He doesn't look like a millionaire, so you guess that the two mortgages are probably for about the same amount, as well.

Now, with renewed confidence -- and before he can ask you what rate you got -- you beat him to the punch. You say: "That's great, what is your annual payment?"

Your new neighbor proudly tells you that his annual payment is "only" \$11,683. You then just mention, with barely concealed triumph: "Gee, mine's only \$9,734." Touche.

Your new neighbor has an 8% mortgage. You have a 9% mortgage. But your annual payments are \$1,949 less than his. How so?

This is an example of how lower rates do not always translate into lower cost. And, it is absolutely critical to remember, whether you are a new home buyer or the chairman of the board of a major water district, that annual cost, not rate, is the crucial number. Annual cost is what comes out of your pocket and the pockets of your ratepayers.

It is neither fair nor accurate to say that rate is unimportant. It is important. It is, in fact, a concept which contributes greatly to the amount you actually wind up paying. But it does not absolutely control the amount you will pay. It is a factor, but it is only one factor. In the next few paragraphs we will see just how this one factor affects the annual payments which you and your ratepayers actually pay.

There are four questions which need to be addressed concerning the concept of Rates.

The first is where rates come from; how rates are set.

The second is legerdemain. Sleight of hand. These are the games -- usually political games -- which people sometimes play with the concept of Rate.

Third is the interplay between principal and interest; how these concepts combine to make annual payments.

Last is the relationship between rate and time. What the "yield curve" is, how it works and how it affects annual debt service payments.

* * * * *

How Rates Are Set.

There are literally bookshelves in major business libraries filled with erudite tomes discussing the precise mechanism of how rates are set. I commend these volumes to you for your reading pleasure. However, in teaching a class, which deals with loans and lending, every year at an institute at the University of Oklahoma, I tell them this:

"In the City of Zurich, Switzerland, there is a bridge near the train station over the River Limmat. Under the bridge there lives a Gnome who has a telephone which only accepts incoming calls. Every morning before the stock exchanges open in New York, the telephone rings. It is the Chairman of the Board of the Federal Reserve System of the

United States of America. He asks what the federal discount rate is. The Gnome tells him. The Chairman hangs up. He then tells all the banks and financial markets. Based on whatever the federal discount rate is, the banks and markets then, in turn, set their own rates.

"Now, as you go through life, you might hear other explanations as to how rates are set. You may even think that one of these other explanations is closer to the truth. But one thing is certain about my explanation: you will never hear anything more accurate."

I stand by the above explanation. It is as accurate as any other explanation you will hear. Here is another one that is only slightly different:

Rates -- whether the prime rate at your local bank or the rate passed on to the Chairman of the Fed each morning by the Gnome in Zurich -- have three basic components: inflation, cost and profit.

Rather than taking an abstract example out of some textbook, let us build one from the bottom up with common sense. Let us say you are going to lend me \$100 for one year and you are considering what rate to charge.

First is inflation. You read in Chapter 3 about the time value of money. \$100 today will not buy you the same amount of groceries in one year. Let us say -- based on past experience --that you think that you will need \$104 a year from now to buy the same amount of groceries that your \$100 will buy today. This means that I would have to pay you at least \$104 just to keep your buying power even. This means a minimum rate of 4%. This is the inflation factor.

Next is cost. Let us say that it costs you \$2 -- in pen, paper, stamps, whatnot -- to make the loan. You will certainly want to recover these costs.

What about risk? Covering your risk may be an intangible cost; but it certainly is a real cost. If you loaned \$100 to fifty different people, you might feel that one of them will not pay you back. In other words, on 50 loans of \$100 each, or \$5,000, you might have one total loss of \$100, or two partial losses of \$50 each, for a total loss of 2% on your loan portfolio. In such case, you would estimate your losses at 2%. This means that your total cost, including estimated losses, is \$4, or 4%. When we add in the 4%, or \$4 for inflation, we are now up to an 8% rate.

Finally, after covering your costs and after charging enough to keep inflation from reducing your spending power, you decide you would like to make a 2% profit. To do so, you must charge me 10%. You will lend me \$100 now, if I agree to repay you \$110 in one year.

This is exactly how it works. But there is a bit more to it.

Remember the Chairman of the Fed and the Gnome of Zurich. Well, the Fed Chairman knows what the inflation rate was last year; but only the Gnome knows what it will be next year. The Fed Chairman knows what his costs are; but only the Gnome knows how much profit to make.

How does this really work in the real world? Something more like this.

You have \$100. You have the option of investing this money or lending it to me. You look at what the bank or other investments will pay you. Then you look at what rate you think the bank would charge me for the same loan. You decide to charge me more than you can get from your other investments but just less than the bank would charge me.

If you followed the procedure exactly as it was just described above, you would be very wise. You would just have accurately measured supply and demand. This is precisely what the Gnome does every morning just before the Fed Chairman calls.

Inflation. Cost. Profit. Those are the three elements from which rates are derived. Each, however, contains unknowns. Measuring supply and demand -- which is what other borrowers and lenders, including the Gnome, think about these unknowns -- is the best way to arrive at appropriate rates at which to either borrow or lend.

Now, having established how rates are made, a few words about the dark side of rates.

Sleight of Hand, by the Numbers.

Mark Twain once said: "There are liars, damned liars and statistics." He was right. There is virtually no limit to the mischief a political interloper can make, given the right set of numbers. Managers and directors of public water and wastewater systems must not only be on guard as to the effect of their fiscal policies, but they must also be on guard as to how those policies can be characterized by political opponents, axe grinders and other general misanthropes.

For example, no one buying a \$3.95 widget at a local hardware store will be deterred from making the purchase because the sales tax is 5%, versus 4%. At a 5% rate, the total cost of the purchase is \$4.15. At a 4% rate, the total cost would be \$4.11. The difference, after all, is only four cents.

But, as any politician who has ever voted to raise any tax will tell you: the difference between a 4% sales tax and a 5% sales tax is not a 1% increase, it is a 25% increase!

In the hands of a political opponent, that increase from 4% to 5% is a 25% increase. An increase from 4% to 6% is not a 2% increase, it is a 50% increase. God help the politician who votes to raise a tax from 1% to 2%. That poor hapless soul is -- as far as the opposition is concerned -- voting for a 100% tax increase! Nowadays, politicians who vote for double digit -- much less triple digit -- tax increases can measure their government careers in the days left till the next election.

It is an axiom of politics that an increase from 4% to 5% is a 1% increase to the incumbent; but it is a 25% increase to his challenger.

Where does the truth lie? As a matter of fact, politicians are always talking about "half-truths." This is a good example of what they are talking about; it is a half-truth. Each interpretation is half true.

The increase in the sales tax causes only a 1% increase in the cost of the \$3.95 purchase. The extra four cents, caused by the tax increase, exactly equals 1/100th of the original purchase price. But it does increase the tax paid from \$0.16 to \$0.20. An increase of four cents on top of the already existing \$0.16 tax is, in fact, a 25% increase. There is no denying either statement. It is both a 1% increase and a 25% increase. Mark Twain would just smile. This is exactly what he had in mind. Numerical legerdemain. Sleight of hand by the numbers.

Where does the truth really lie? In point of fact, the correct characterization should really be that it actually is a 25% increase in the tax, but only a 1% increase in the cost.

This brings us back to our overriding concern: cost.

Principal, Interest and Annual Debt Service Payments.

Apart from the obvious political concern, which all water and wastewater system managers and directors should rightly have about possibly adverse characterizations of their actions, the major concern is the impact of rates -- in this case interest rates -- on the total cost of service to system users.

The first point to remember here is that interest rates are only one component of annual debt service payments; and, annual debt service payments are only one component of the annual charge for water or sewer service. Interest rates are important; but their importance must be gauged in light of total service charges.

Having said this, we should now make the point that a change in interest rates from 4% to 5% is, in fact, a 25% increase in the interest rate; but it does not mean a corresponding 25% increase in annual debt service payments. An increase in the interest rate on a 20-year loan from 4% to 5% does not increase the annual debt service payment by 25%. The annual debt service payment on a 20-year loan of \$100,000 at an interest rate of 4% is \$7,358. The annual debt service payment on a 20-year loan of \$100,000 at 5% is only \$8,024. The increase is \$666, which is only a 9% increase.

The reason for this is the interrelationship between principal and interest in calculating annual debt service. The relationship is a dynamic one where each of the elements changes over time.

What is important to remember is that **the percentage change in interest rates is less than the percentage change in annual debt service payments**. So, you must remember, if you are ever in a situation where you must agree to a higher interest rate on a project loan, that the annual debt service payments which your ratepayers make will increase, but by a lesser amount.

One final note before going on to the infamous "yield curve."

A few paragraphs above we pointed out that rate was only one component on annual debt service; and that annual debt service was only one component of the total system user fee. Let us restate that concept in an example.

Recall, from the discussion above, our \$3.95 purchase in the hardware store. We established that the 25% increase in the sales tax caused a 1% increase in the purchase price. Of the total purchase price of \$4.15, 1%, or \$0.04, was attributable to the increase in the sales tax.

Now, let us say that this same customer made two purchases that day, one subject to sales tax, and the other not subject to sales tax. Let us say that the purchase not subject to sales tax was also for \$3.95.

Now, the customer's total bill is \$4.15 plus \$3.95, or \$8.10. Out of the new total bill of \$8.10, the \$0.04 attributable to the increase in the sales tax is now only 0.5%.

The point here is that board members are often confronted with having to vote today for a project loan proposal with a higher rate of interest than the same proposal would have carried, say, three months ago. As such, they may have to face some political heat because of the increase. If this is ever the case, those board members must prepare their rebuttal with a few points in mind.

First, it is not how much the rate increased that really matters; rather, it is the annual debt service payment. Increases in rate do not translate

into equivalent increases in annual debt service payments. Second, annual debt service is only one (and it may not be a large one, at that) component of the total system user charge.

So the directors' rebuttal should, of course, state the reason why it was imprudent to proceed three months ago, and then go on to point out that the allegedly huge increase in interest rates -- that their opponents complained of -- actually resulted in only a few pennies, well spent, on the monthly bill.

Now, for the last, but certainly not least, matter to consider concerning rates.

The Yield Curve.

The "yield curve" is one of those phrases that always comes up during project financings. It is frequently used by financial advisors and investment bankers. It seems shrouded in mystery. Especially when they call it an "inverted yield curve." It is, in fact, one of those phrases which make people think that basic finance is a form of black magic.

The first thing to do is to take away the quotation marks. It will no longer be called the "yield curve," but, rather, the yield curve. The next is to state that it is not a curve at all. At least not in the mathematical sense of a curve. Last, there is no equation or formula for the yield curve. All of the mathematicians in the world working together, simultaneously, forever, could not derive a yield curve.

Everyone who walks by the window of a bank now and then and looks at the signs in the window knows that you can earn different rates of interest depending on how long you are willing to leave your money in the bank. If you sat down and made a graph -- with the different rates of interest along the vertical, or y-axis, and the different time periods along the horizontal, or x-axis -- and put a dot for each different interest rate at each time period, and then connected all the dots with a line; you would have just created the yield curve.

As you can see, it is really not a curve at all. It only becomes a curve if you want to display the information graphically. Of course, most financial publications, such as The Wall Street Journal or The Bond Buyer, do present the data in graphic form. Hence, it has come to be called -- by people in the finance business -- the yield curve.

Figure 10-A, below, is an example of what a yield curve might look like on any given day. Please note that Figure 10-A presents the yield curve for each of three separate bond issues sold at approximately the same date.

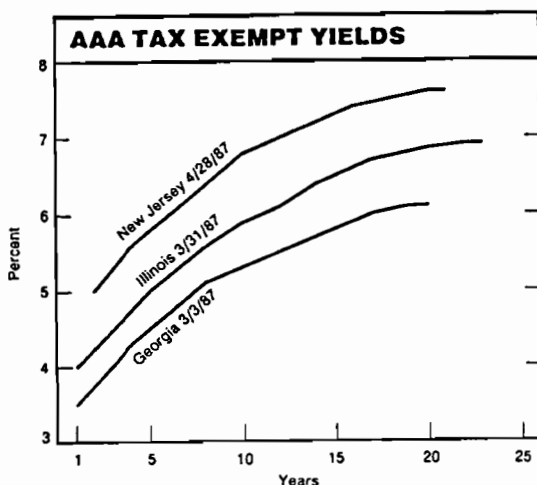


Figure 10-A

As you can see in the Figure above, interest rates are increasing over time. Rapidly at first; then more slowly. Between years 15 and 20, the rate barely rises at all. The curve is virtually flat.

There are three brief observations to be made about the yield curve.

The first is the yield curve is a useful device if you are going to finance a project in the bond market or with a financial institution whose rates vary over time. In such case, you would be well advised to obtain not necessarily a yield curve per se, but, rather, a listing of the rates for various loan or bond maturities. Your financial advisor or banker should be able to supply you with one. This should be extremely useful to you in making up your mind as to the most desirable maturity for your loan or bond.

For example, if the yield curve is flat between years 15 and 20, and you have the option of either maturity, you might well opt for the longer maturity which will, in such case, always mean lower annual debt service payments for your system's users. (See Chapter 9, Term.)

The second observation relates to the shape of the yield curve.

You will almost always see yield curves shaped like the one in Figure 10-A, above. That is, it will be low on the left end -- corresponding to the shorter terms -- and will rise to the right, reflecting higher interest rates for longer terms.

Once in a great while, you may see an "inverted" yield curve. In an inverted yield curve, the higher interest rates are at the shorter maturities and the lower interest rates are at the longer maturities. In other words, the curve is high on the left end, and low on the right end. The most notable time this occurred was in 1981, when the prime rate in the United States was 21%. At that time, the long-term rates were actually lower than the short-term rates!

How so? What determines the slope of the yield curve? This leads us to our final observation about rates, which is why rates -- and, hence, the yield curve -- change over time.

The answer harkens back to Chapter 3 of this book and the discussions there concerning the time value of money. The value of money changes over time because of inflation.

In the example early in this chapter about the Gnome of Zurich, we said that rates were determined based on three factors: inflation, cost, and profit. There is no reason why, in setting a given rate, that either cost or profit should escalate over time. (They do increase, of course, in terms of actual dollars and cents. But they should not increase as percentages; and rates are percentages.) Inflation, however, is a different matter.

As we previously discussed, the only clue we have to tomorrow's inflation rate is yesterday. But what about next year, or ten years from now?

When we say that yesterday's inflation rate is a clue to tomorrow's rate, what we are really saying is that we are familiar with the relative strengths and weaknesses of the various forces at work today and in the recent past. We then look forward to see if there are any events -- such as wildly excessive government spending -- which would upset the current dynamic equilibrium of economic forces. Seeing none, we simply assume that these economic forces will continue to work in the same way, producing inflation for tomorrow and the foreseeable future at just about the same rate.

So, in other words, for the short term, yesterday's inflation rate will be tomorrow's inflation rate.

But, as we look beyond just tomorrow or next year, we begin to lose confidence in this fragile assumption. What about another oil embargo? What if, God forbid, there is another war in the Middle East? What

effect will the forthcoming nuclear disarmament have on our economy? We may think we know the answers to these questions now; but what about five years from now?

That is what is happening to the yield curve and to the long-term rates it describes. They are reflecting uncertainty. The uncertainty of the future and what it holds for the economy.

When faced with uncertainty, what do people do? They hedge their bets. The fact that interest rates increase over time is the direct result of borrowers and lenders hedging their bets about the future.

Why did the yield curve invert in 1981? The answer is that the people (including some economists) felt that the economic troubles the country was going through at that time were acute. That they were not going to last more than a few months or a few years at best. So, at that time, short-term rates were very high, and long-term rates were much more modest. That, however, was an anomaly. Usually, the shortest term rates are the lowest. Rates usually rise relatively rapidly over the next few years. Then they plateau. The rise reflects the growing effect of uncertainty over time. And the plateau reflects the exhaustion of the uncertainty process; the fact that it is unreasonable to assume that inflation will inexorably increase forever.

That is what interest rates are, where they come from, how they work, and, most importantly, how they affect the eventual costs which the users of water and wastewater systems have to pay.

Chapter 11

Financing Costs

In the preceding two chapters of this section, we have dealt with financial factors which affect the annual debt service payments, which ratepayers of water and wastewater systems ultimately wind up paying. In specific, we looked at the effect of rate on annual debt service payment in Chapter 9, and we looked at the impact of term on annual debt service payments in Chapter 10. Rate and term are two of the three mathematical variables (The third is principal.), which comprise the actual equation used to calculate annual debt service payments.

In this chapter we are not going to deal with mathematical variables. Rate and term are abstractions. They are very important, even critical, to the financing process; but they are abstractions. On the contrary, in this chapter, we are going to deal with factors which increase cost in plain dollars and cents. The costs in this chapter are not the kind which can be looked up on a table, or which can be derived with a formula; rather, they are the type of costs which are paid by check.

Let us begin with a definition.

Financing costs are those expenses directly related to the obtaining of funds for capital improvement projects. They are the costs of obtaining the funds, themselves, or of making the funding possible in the first place.

Financing costs do not include interest payments.

Below are the eight most common forms of financing costs.

- Commitment fees or points.
- Counsel fees.

- Financial advisory fees.
- Servicing fees.
- Investment banking fees.
- Credit enhancement fees.
- Rating agency fees.
- Printing and miscellaneous costs.

As you can see, by their very nature, with the exception of the commitment fees and the underwriter's discount, the above costs are paid to third parties which facilitate the loan or bond transaction. The commitment fee and the underwriter's discount are paid directly to the bank or the initial bond purchaser (the underwriter), as a concession or inducement for them to make the loan or purchase the bonds, respectively.

Almost all financing costs are paid at closing. The exception to this rule is the commitment fee. Commitment fees are generally paid upon acceptance of the commitment to finance. This means that they are paid before the closing, although they may be recouped at the closing.

We will now take a close look at each of these types of financing costs.

Commitment fees or points.

Commitment fees or points are commonly associated with bank loans as opposed to the issuance of municipal bonds.

Although the nomenclature is by no means clear or universal, commitment fees are generally 1% or 2% of the loan principal amount and are paid upon acceptance of the bank's commitment to lend. The term "points," on the other hand, most often refers to fees which are also 1% or 2% of loan principal and which are paid at the closing out of loan proceeds. On any given loan, there may be neither, either, or both; although the total of such fees seldom exceeds 2% of loan principal.

As you have seen in several previous chapters, "points" are simply an additional payment to the lender which has the dual effect of increasing the banker's yield on the loan and also of increasing the borrower's annual debt service payments and his True Interest Cost (TIC). They simply constitute additional compensation to the lender, and must be calculated into the real cost of the loan whether by the Annual Payment Method or the Total Payment Method.

Commitment fees, on the other hand, are ostensibly a form of compensation paid to the bank or lending institution for reserving funds from the time of commitment to the time of disbursement. In addition, they are also supposed to protect the bank against the possibility that you will not close your loan, i.e., their already reserved funds will not ultimately be used in a timely manner.

We say "ostensibly" because, notwithstanding what they appear to be, or how anyone might choose to characterize them, commitment fees are simply a means of increasing the yield of the lender. They, too, are additional compensation to the bank. Furthermore, if their true purpose were simply to protect the bank against the borrower's failure to close, then the commitment fee would be refundable to the borrower at closing, wouldn't it? But, of course, it isn't.

In addition, if commitment fees were actually related to the cost of reserving funds they would have two characteristics. First, the amount of the fee would relate directly to the bank's cost of funds. This means that if we were in a 12% interest rate environment, the commitment fee would be 1% a month. If the going rate were 6% a year, then the commitment fee would be 1/2% a month. As a matter of fact, most commitment fees are between 1% and 2%, regardless of the interest rate environment. The period for which the funds are reserved are generally from one to six months, again regardless of the interest rate environment.

The second characteristic would be that if the fee were actually related to the time period between the commitment and the closing, then the fee should relate to the volatility of interest rates during such period. That is, the fee should directly relate to the possibility that between the time of commitment and the time of closing, rates would rise so much so that at the time of disbursement, the bank would actually be making a submarket rate loan. In point of fact, this is also not true. Banks charge commitment fees when rates are flat. They even charge commitment fees when rates are falling. The only thing which can be said is that in the early 1980's when interest rates were rising abruptly, the banks did actually behave like their commitment fees were related to rate volatility. At that time, they actually shortened their commitment periods.

None of this is to say that there is anything wrong with commitment fees, or points. They should simply be recognized for what they are and calculated into the total borrowing cost by either the Annual Payment Method or the Total Payment Method.

Counsel fees.

Counsel fees are quite straightforward. They are fees paid to the lawyers who close the transaction, and, in many cases, assist in negotiations.

In addition to the fees paid to various attorneys, each of them will expect to be paid for their actual and necessary expenses involved in the transaction, including travel costs to and from meetings.

Unfortunately, when it comes to loans for water or wastewater systems, there is usually more than one and often several lawyers to pay. Let us review the cast of all possible attorneys on a given transaction.

House counsel.

The house counsel, or in-house counsel, is a member of the staff of the water or wastewater system, if, of course, the system is large enough to warrant a full-time lawyer on staff. Most are not. As such, many smaller systems have a part-time counsel, who is otherwise free to practice law privately. It is as if the system is just another, albeit important, client to such lawyer.

If the attorney is a full-time staff member, then there are no additional direct payments to that attorney for assisting in the project financing. If the attorney is part-time, his work on a capital improvement project may be covered by his monthly retainer. It may be on an hourly basis which may be partially covered by the monthly retainer. Such work may also be on an hourly basis over and above the monthly retainer.

There are two points to remember here. The first is that project financings can get very complicated, and the areas of the law on which they impinge can be quite esoteric. Not all lawyers will be able to competently handle project financings. This is certainly not because such lawyers aren't smart enough; but rather it is because project financings happen so infrequently that many lawyers simply aren't up to date in all of the areas of law involved. So, the first point is to ascertain whether your in-house counsel or your part-time counsel has the experience necessary to properly advise you on the transaction.

Unless you do a project financing at least every other year, you should not expect your in-house counsel to have requisite experience. The same is true of your part-time counsel.

The point, here, about experience is that if a lawyer does not have certain expertise at hand, he can certainly do the readings and take the other necessary steps to inform himself in the areas of law in which he may not be up to date. This process, although worthy, is expensive. Bringing any lawyer up a learning curve can be very costly. Always remember, you are paying for the lawyer's time. The more time it takes for him to familiarize himself with project financings, the more it will cost your ratepayers.

This leads us to the second point which is how to handle the cost. Always negotiate the cost in advance. This is true of all of the lawyers involved in a project financing.

The best basis for the negotiation is an hourly fee against a maximum. As such, you will be able to contain the learning curve costs. And, by using the maximum in your financial projections, you will have a firm basis for your estimates.

Outside counsel.

Many systems engage outside counsel to assist on the financings of capital improvement projects. The term "outside counsel" is a casual phrase. What is really meant here is a law firm with special expertise in project financing. Their "outsidedness," if you will, is not what is important; it is their special expertise.

Here again, a few rules to follow. Get estimates. Make sure the estimates are stated in hourly terms with a maximum. Use the maximum as the basis for your project cost estimate.

Lender's counsel.

As anyone who has ever purchased a home knows, when dealing with a bank, not only do you pay your own lawyer, but you also pay the bank's lawyer. The same is true for water or wastewater systems, or for any other type of business, for that matter.

If your correspondence with the bank does not include any reference to the bank's counsel fees, don't be shy. Ask. Do not think for a moment that because such reference may not be there, that you will not have to pay these fees. You will undoubtedly be presented the bill at the closing. And, it is far better not to be surprised.

In addition, not only is it appropriate to ask about the counsel fees, but it is also appropriate to ask how much they will be, and to get that information in writing. Here, again, the bank's counsel is not likely to give you a specific number; but they should be willing to give you an estimate. Under such circumstances, you should have your counsel insert language in all relevant correspondence with the bank that your system agrees to pay the bank's counsel fee "an amount not to exceed x dollars." You should then hold them to that agreement.

There is one exception: unforeseen circumstances. As much as we all might like to insist on a pre-agreed upon fee regardless of any unforeseen circumstances, you may not be able to get either the bank or its counsel to assent to such an unforgiving formula. After all, you, yourself, might create the unforeseen circumstance. It would not be realistic to expect anyone to work for free to solve a problem which you, yourself, created.

Under such circumstances, you should be willing to agree to pay the bank's counsel "an amount not to exceed x dollars, unless otherwise agreed to, in advance, and in writing." Thus, if some unforeseen event does arise which adds complications to the transaction, the lender and his counsel know they have to come back to you to get a written increase. If they don't, you don't owe them an additional penny.

This is a very fair formula for dealing with unforeseen events. You should insist upon it, in writing. And, then, you should use this amount to calculate the true project cost to your ratepayers.

Where you have a loan, you have a lender, and a lender's counsel. Where you have a bond, you generally have an underwriter, who purchases the bond, and an underwriter's counsel.

Underwriter's counsel.

The role of the underwriter's counsel is similar to that of the lender's counsel. And you should deal with the matter of the underwriter's counsel fee in the same manner as you would deal with the bank's counsel fee.

In other words, you should insist on an estimate in advance and in writing. Your agreement with the underwriter should include a paragraph to the effect that you agree to pay the underwriter's counsel fee "in an amount not to exceed x dollars unless otherwise agreed to in advance and in writing."

You should be aware that lawyers who represent banks tend to do a great deal of legal work for the bank. Bank clients are usually big

clients. Lawyers who represent underwriters do not necessarily do great amounts of work for the underwriter. Bankers, therefore, tend to have better control over their lawyers than do investment bankers.

The point here is that an underwriter's counsel is more likely to balk at your request for a firm estimate.

Do not be deterred. If the lawyers are testy and obdurate on this point, stick to your guns. There are other lawyers in the world. And, ultimately, there are other underwriters in the world, as well. Insist on the estimate - in writing. And, insist that the language suggested above, or some reasonable variation thereof, be included in your written contract with the underwriter. You are entitled to this. Just remember, one of the most unpleasant experiences in the world is to be handed a large, unexpected legal bill at the end of a bond closing.

And.....while we are on the subject of being handed large legal bills at the end of a bond closing, we might as well move on to the bond counsel.

Bond counsel.

In addition to paying for the lawyers on both sides of the transaction, whenever you finance a capital improvement project with a municipal bond, you will find there is one more lawyer whom you must pay, the "bond counsel." A bond attorney is a specialist in the several areas of law which involve municipal bonds.

Literally no one will purchase a municipal bond which does not have the written opinion of a bond counsel both as to the validity of the bond and as to the fact that the interest on the bond is exempt from federal income taxation, as well as state income taxes, if applicable.

There are two important things to remember about bond counsels. They are expensive and, even though the water or wastewater system, itself, is the client, they tend to be very independent-minded.

Bond counsel seem expensive because, unlike the other lawyers in the transaction, you are paying for their opinion, not their time. It should come as no surprise in this age of electronic information that bond counsels have many sets of documents tucked neatly into the folds of their word processors. The impressive tomes which they produce owe more to the quality of laser-jet printer than to the fact that some young lawyer sat up all night handcrafting every clause. No, bond counsel are not paid for their time.

As said previously, no one will buy a bond without a bond counsel's opinion. That is what you are paying for. And it is expensive. If for some technical reason your bonds have not been validly issued under state law, or if the interest thereon is not, for any reason, exempt from federal income taxation, then the bondholders who bought those bonds will undoubtedly sue the bond counsel on whose opinion they relied. So, as you can see, the bond counsel has a great deal of responsibility and a great deal of liability. Some wags say that the majority of the fee goes to pay the premium on the bond counsel's malpractice insurance. Whether there is any truth to such sayings or not, the bond counsel is, nonetheless, expensive.

Bond counsels tend also to be very independent-minded. Because it is their opinion which is valued, bond counsel value their integrity over their clients. (This, by the way, is as it should be.) But because of this tendency, they often get tetchy when you try to negotiate with them, especially on their fees.

On most moderate-sized financings, the bond counsel will get a small percentage of the par amount of the bonds. One half of one percent (0.5%) is a typical fee. With smaller transactions, there may be a flat fee. Thus, a bond counsel might say that his firm usually gets a half a percent or a minimum of \$3,500.

But, by the same token, a bond counsel who expects a minimum fee, should also be held to a maximum fee, especially for large, relatively uncomplicated transactions. Once your system's projects start getting close to \$10,000,000, you should definitely start putting a maximum in the bond counsel retainer agreement. For a \$10,000,000 bond, a 0.5% bond counsel fee would be \$50,000. At this level you should certainly be able to negotiate. After all, this is a very nice sized fee. There aren't a lot of bond counsels, but there are enough. You can be certain that unless your transaction involves bizarre or unusual circumstances, a reputable bond firm should be willing to do the work for \$50,000.

Let us leave the section on attorneys by saying that of all of them, the bond counsel is, by far, the most important. On many projects, it is the bond counsel who drives all of the parties and who actually gets the deal done. And, having said that bond counsel is important, we now turn to the single most important source of expertise on project financings for water and wastewater systems: the financial advisor, or FA.

Financial Advisory Fees.

A good financial advisor is the most important member of the team of experts who assist your water or wastewater system in financing its projects. As a matter of fact, a good financial advisor can advise you on what all of the other experts on the team should be doing. The FA can even put the team together for you and provide the leadership to get the transaction closed.

Your FA should be your closest advisor on the project financing. If you select the right FA, he will wind up advising you on far more than just narrow questions of finance. In most cases he will actually wind up driving the deal, organizing all of the steps necessary to close. The FA should be chosen first and his advice should be looked to in choosing all of the other members of the team.

When choosing your FA, take your time and be sure that you find someone with whom you and your colleagues at the water or wastewater system are comfortable. Oh, of course, be sure the FA has all the right credentials on paper. That is important. And, be especially sure that the FA has done many similar (i.e., water or wastewater) projects in your state. This will insure that the FA knows all of the state laws and state procedures for financings of this type. Although the FA is not a lawyer, he will be able to tell you how other water and wastewater systems deal with certain state law requirements on a day to day basis. This type of advice can be invaluable.

The FA will help you choose your outside counsel. He should be familiar with firms throughout the state which regularly do the type of transactions with which your system is involved. He should also have a good idea what these firms charge for their services.

The FA should, of course, be able to advise you on all of the financial questions involved with your project. What is the best term? What rates are available at that term? Assuming you have more than one financing option, what are the additional financing costs associated with each? And the two most important questions: Which will provide the lowest annual cost to system ratepayers? And, which will provide the lowest total cost to system ratepayers?

Needless to say the FA will be able to do all of the calculations necessary for board meetings and public hearings. The FA can even do runs of "what ifs" to give you and your colleagues a sense of what might happen under various cost scenarios.

FA's used to charge a fee based on a percentage of the transaction. Nowadays, however, FA's seem to be going to a split fee basis. They

charge an hourly rate and get a bonus, if you will, in terms of a small percentage of the final transaction. The hourly rates are likely to be in the range of \$75 to \$150. The "bonus" is likely to be in the range of 0.25%.

FA's are generally amenable to a cap or maximum on their hourly fees. Such payment clauses as "\$100 an hour up to a maximum of 50 hours are not uncommon. As far as unforeseen events are concerned, this should not be difficult. The FA should spend a large part of his billable time in your office. You should be able to casually keep track of the hours spent. And, if the transaction gets complicated, or if many more hours than planned are required of his time, you should not be surprised at a request to increase the agreed upon number of hours.

The FA is your consultant. And, as is the case with the attorneys involved in the transaction, the FA will expect to be reimbursed for his actual and necessary expenses, including travel costs to and from meetings.

Servicing Fees.

Servicing fees occur in both loan and bond transactions. They cover the administrative costs of collecting the system's loan or bond payments and crediting them to the proper accounts.

In the case of a bond transaction, the servicing fees are generally called trustee fees, and they are larger than the servicing fees involved in a loan transaction. This is because in a bond transaction, the trustee must not only collect your payments and credit them to the proper account, but he must also pay each of the bondholders their proportionate share of each payment when due.

On a bond transaction, whether it is publicly sold or privately placed, the investment banker is seldom the ultimate owner of the bonds. On a private placement, the investment banker never owns the bonds at all. He actually arranges for the sale of the system's bonds to a third party prior to the closing. On a public sale, the investment banker, or underwriter, actually purchases the bonds at closing; but then he usually sells the bonds to his clients as soon as possible. So, on bond transactions the ultimate owner is rarely the investment banker with whom you are dealing.

This is why a trustee is necessary. The trustee actually acts on behalf of the bondholders, whoever they may be. He collects your payments and sees to it that each bondholder gets his proportionate share.

In addition, should a system become delinquent or actually default on any of its payments, the trustee acts as the legal representative of the bondholders in their efforts to secure their rights against the defaulting system.

Because the trustee's duties go far beyond those of a simple servicer (i.e., the trustee does far more than just collect funds and has a much greater legal liability to the bondholders), his fees will be commensurately higher.

In the past, it was common that servicing fees or trustee fees were expressed as a percentage of the outstanding principal balance of the loan. This was a crazy system, especially for just servicing. It obviously takes the same amount of effort for a bank to collect and credit a \$1,000,000 payment as it does a \$1,000 payment. Thus, there is no reason at all why a servicing fee should be based on the amount of the loan.

Servicing fees should be flat fees; and they should clearly be a part of the system's negotiations with its lending bank. The system's FA should be able to advise as to what servicing fees are appropriate.

Both servicing fees and trustee fees should involve a set-up charge, which is payable at closing, plus an annual fee thereafter.

As previously stated, trustee fees on a bond transaction should be higher; and there is even some justification for basing them, at least in part, on the outstanding balance of the bond issue. They should be higher in general because trustees have more extensive duties. The justification for basing them on the outstanding principal balance is because, if the trustee errs, he may become liable to the bondholders for the whole debt. This is a serious responsibility; and trustees expect to be compensated for taking on this responsibility.

Nonetheless, even in the case of a trustee, most of the duties are administrative and bear no relation to the size of the bond issue. Furthermore, should there be a problem with a system's payments or with securing a system's compliance with the terms and conditions of the bond indenture, the trustee can be compensated separately for any extraordinary actions in this regard.

The point to remember here is to seek the advice of the FA; and then to shop, wherever possible, for the most reasonable trustee fees. When you are borrowing from a bank, you have no say at all about the servicer; in virtually all cases, it will be the bank itself. But when you have a bond issue, the choice of trustee is up to you. The system's FA will be able to furnish a list of banks, including regional and national banks, who are willing to serve as trustee on water and wastewater

system bonds. By shopping these banks under the guidance of its FA, a system should be able to settle on reasonable trustee fees for its transaction.

Investment Banking Fees.

Investment banking fees are the compensation which an investment banker receives for either buying or arranging for the sale of bonds. Such fees are, of course, limited to bond transactions.

There are three types of bond transactions. The first is public sale. The second is negotiated sale. And, the third is called private placement.

Whether a water or wastewater system's bonds are sold publicly, by negotiated sale, or by private placement is first and foremost a matter of state law. Your attorney and your FA should be able to tell you immediately whether your state requires public sale. If there is no state law requirement, the choice is generally up to the system. I say it is generally up to the system, because with very small bond issues, say less than \$250,000, a public sale may just not be economically feasible.

Public Sale.

With a public sale, the bonds are sold by bid. Under such circumstances, when all of the other requisites of the transaction are complete and the legal documentation is in order, the system's FA will arrange for notices of sale to be published in authorized newspapers. He will also generally directly contact investment banks and banks in the region whom he knows to be regular purchasers of water and wastewater system bonds. On the appointed day, bids will be submitted and opened in public; and the bonds will be sold to the lowest responsible bidder.

The banker who wins the bid will be compensated through the bid structure. For example, the winning bid might be 98 1/2 at 7%. This means that the stated interest rate on all the bonds will be 7%, and that the system will receive 98.5% of the proceeds. Under normal circumstances, the winning banker, or underwriter, will reoffer the bonds to the public at par, or 100%. In this case, the underwriter's compensation is 1.5% of the bond issue. (Please see Chapter 5 to determine the True Interest Cost (TIC) for such transaction.)

This type of fee is called the underwriter's discount. The winning investment banker doesn't necessarily keep all of this money. He keeps

a part of it for managing the transaction on behalf of all bond purchasers. But, especially on larger issues, the underwriter will share the larger part of this compensation with other investment bankers who assist in selling the issue. The other investment bankers technically purchase the bonds from the underwriter, but at a lower discount.

Negotiated Sale.

For negotiated sales, there is no public bidding procedure. Rather, under the guidance of the system's FA, the credentials and experience of several underwriters are reviewed to determine, based on past performance, which firm is likely to offer the system the lowest cost, including the underwriter's discount, on a TIC basis. Once this determination is made, a contract is signed with the underwriter. When the transaction is ready to be closed, the underwriter then actually prices the system's bonds. And, at closing, the underwriter purchases the bonds at that interest rate.

Negotiated bids may look questionable, but they really are not. If, based on the advice of the FA, the system does not like the price quoted by the underwriter, it is perfectly free to reject the price. If this happens on more than one occasion, the system may actually have grounds to rescind the contract with the underwriter. This, however, rarely happens. Underwriters make their living selling bonds. They do not make their living by deceiving bond issuers. If they did so, they would not last long in the highly competitive bond market. Furthermore, the FA would certainly know if an investment banker had a reputation for lowballing estimates, and would advise the system simply to avoid doing business with such an unscrupulous firm.

Private Placement.

The third basis for selling bonds is by private placement. In a private placement, the investment banker does not purchase, or underwrite, the bonds himself. Rather, he arranges for the sale of the bonds directly to one or more, usually, large institutional investors. For this reason, private placements are more common with smaller bond issues.

Under these circumstances, since the investment banker does not actually purchase the bonds, he is not called an underwriter; rather he is called a private placement agent. Notice the use of the word "agent."

With a private placement, the investment banker actually serves as an agent of the water or wastewater system to effect the sale of its bonds, much like a real estate agent serves a homeowner to effect the sale of a house.

Here again, under the expert advice of the FA, a system would request proposals to serve as private placement agent from competent firms in the region. The system would review these with the FA and probably interview several of the best candidates. Once a system was satisfied with a particular firm, it would then execute a private placement agency agreement with that firm. The agreement would require the agent to place the bonds, on a best efforts basis, at the best all-in cost to the system. When the transaction was ready to close, the placement agent would shop the bonds in the market to obtain the best possible price for the system, and would report that price to the system. Here again, the system is free to accept or reject the price.

The difference between underwriting and private placement is the difference in the legal obligation of the investment banker to the system. In an underwriting, the banker must purchase the bonds at the agreed upon price. With a private placement, he is only obligated to **use his best efforts** to sell the bonds at the agreed upon price. In other words, if, between the date upon which the price was agreed to and the date of closing, the market went up like a rocket, the underwriter would still be obligated to buy the bonds at the stated price. But, if for any reason, the placement agent's client refused to accept the bonds at the agreed upon price, the placement agent would be under no obligation at all either to buy the bonds himself or to find a new buyer at the old price.

Now, all of this may seem somewhat precarious, but in real life it is not. Certainly, in sharply rising markets, deals do fall apart once in a while. But this only happens once in a great while. As you might imagine, investment bankers protect themselves by lining up purchasers in advance whom they know will honor their obligations. The old saying that "whatever goes around, comes around" is also true in the bond market. No one would do business for long with people who reneged on their deals. Furthermore, the next time, the market might go the other way in which case a reneging purchaser might find himself out in the cold.

As you can see from the above, the liability and responsibility of underwriters are different from those of placement agents. You might guess from your reading about the different liabilities of trustees and servicers, that there might be a difference in compensation level, as well. If you made that assumption, you would be right. But, unfortunately,

the question of compensation is not only more complicated than that, but it also far more important than just a simple matter of compensation. Here is why.

The absolute best rate obtainable on a private placement will never be as low as the best rate on an underwriting. The reason for this has to do with the size of each market. Furthermore, because the markets are of different sizes, selling in one requires more work than selling in the other. Hence, the compensation levels differ, as well.

The market for private placements is relatively small. Bonds sold through private placement generally are split into very large denominations, the only purchasers for which are institutions and the occasional wealthy individual. Because this market is relatively small and the denominations of private placement bonds are so large, relatively speaking, it does not take investment bankers a great deal of effort to sell them. On the other hand, institutions and wealthy individuals tend to have very professional staffs who know the market inside out, and who are very aggressive about pricing. For that reason, and also because large denominations of small bond issues tend to be less liquid (i.e. They are not easily resold.), buyers of private placements want higher interest rates.

There is an obvious tradeoff here. The higher interest rate will, at least to some extent, be offset by a lower fee to the private placement agent.

The public market, on the other hand, is composed of literally millions of individuals, like you and me, who do not spend every workday buying and selling water and wastewater system bonds. The public market will, therefore, accept lower interest rates. The other side of the coin, however, is that to deal in the public market requires bonds of relatively small denominations; and it requires a great deal of effort to sell many small pieces as opposed to a few large pieces. For this reason, publicly traded bonds (including those which are issued in a negotiated sale), carry lower rates of interest, but require higher investment banking fees. They also command higher investment banking fees to compensate the underwriter for the risk he takes that rates may rise and he may be stuck with the bonds. Here, again, is a tradeoff.

Which is better? Public sale? Negotiated sale? Or, private placement?

As stated above, there may be legal or economic reasons why you do not have all three options open to you. But no matter whether you have three options or no options, your FA will be able to inform you what your options are, in any given set of circumstances, and to assist you in

calculating the investment banking fees for the transaction and converting such fees into True Interest Cost (TIC).

Credit Enhancement Fees.

The expense of credit enhancement fees applies only to a transaction which, one, is a bond transaction, and, two, is one in which the issuing system elects to use credit enhancement, assuming it is eligible. In other words, credit enhancement is by no means an expense which one automatically adds to the bill.

There are two types of credit enhancement: municipal bond insurance and bank letters of credit. The phrase "credit enhancement" is itself a sticking point in the finance industry. Those companies which provide credit enhancement want the world to know that the words mean just what they say. Such companies are willing to "enhance" the credit of a water or wastewater system, but they are not willing to substitute their credit for the system's credit. In other words, they will make a good credit better; but they will not make a bad credit good.

This means that the first question is eligibility. To be eligible for credit enhancement, a water or wastewater system must have at least one of the four highest credit ratings from one of the four nationally recognized credit rating agencies. The four major rating agencies are: Standard & Poor's, Moody's, Fitch Investors Service and Duff & Phelps. The four highest rating categories (using Standard & Poor's nomenclature) are: AAA, AA, A, and BBB.

The four highest ratings are collectively known as "investment grade" ratings. An investment grade rating means that the bond is eligible to be purchased by trusts, pension funds, and the like; which have fiduciary duties to invest their clients' funds in only the most sound investments. Credits which do not fall into the four highest categories are regarded as speculative investments. They are called, simply, non-investment grade, which is abbreviated to "NIG." Occasionally an NIG rated bond can be credit enhanced, but rarely so. The credit enhancers are penalized by insurance and bank regulators for guarantying NIG credits.

So, if your system does not have an investment grade rating, or cannot get one, it will most likely be unable to avail itself of credit enhancement. The only exceptions relate to strong credits where an investment grade rating is unavailable for technical reasons.

The purpose of credit enhancement is to lower TIC. In short, the only time a water or wastewater system would want to purchase credit

enhancement is to lower its interest rate such that, even after paying the credit enhancement fee, it had a net savings in TIC. In other words, the savings must more than offset the cost of the credit enhancement. Unfortunately, not all credit enhancers lower interest rates by the same amount. Therefore, to calculate savings accurately, you must not only know the precise cost of the credit enhancement, but also the precise amount by which the bond interest rate is likely to decline if your system elects to purchase the enhancement.

To cut through some of this complication, we will first review the two forms of credit enhancement and then we will run through a couple of illustrations of how to calculate the savings.

Municipal Bond Insurance.

The most widely used form of credit enhancement is municipal bond insurance. There are five companies in the United States which offer municipal bond insurance. All have at least one AAA rating from a major rating agency. But, unfortunately, all AAA ratings do not trade at identical rates.

Bond insurance premiums are calculated on total debt service. This means the actual amount (not the discounted amount) of all annual debt service payments.

Let us use a Level Payment Bond of \$1,000,000 for a term of twenty years at a rate of 7% as an example. The annual debt service payment on such a bond would be \$94,393. The total of all annual debt service payments would be the annual debt service payment times the number of years in the term, or $20 \times \$94,000$, for a total of \$1,887,859. This is the number upon which the bond insurance premium is based.

The premium rate is based on the existing credit rating of the water or wastewater system. If your system enjoys a AA rating, your premium could be as low as 0.35%. If yours is the rare, insurable NIG rated system, your bond insurance premium rate could be as high as 1.4% of total debt service.

To calculate the premium, you simply multiply total debt service by the premium rate. For the AA credit in our example, the bond insurance premium would be $\$1,887,859 \times .0035$, or \$6,608. For the NIG credit in our example, the premium would be $\$1,887,859 \times .014$, or \$26,430. As you can see, the difference can be a great deal of money. The AA premium is just over one-half of one percent of the bond principal

amount. The NIG premium, on the other hand, is over two and one-half percent. A difference of almost 500%!

A final note about bond insurance: beware of minimum premiums. Certain bond insurance companies require minimum premiums. If your bond is below several million dollars, ask your FA to inquire about minimum premiums.

Bank Letters of Credit (LOC).

The other type of credit enhancement is the bank letter of credit (LOC). LOC's are similar to bond insurance except in three very important ways. First, letter of credit fees are paid annually, whereas bond insurance premiums are paid once, upfront. Second, letters of credit are rarely issued for the full term of the bond. This can present some real difficulties. Third, few banks still have the AAA ratings, which the bond insurers have, so it is more difficult to calculate true savings.

Let us say your system obtains a seven year LOC on its twenty-year bond issue. In such case, the bond documents will be changed to reflect the fact that if the bank does not renew the LOC, or if you are unable to obtain a substitute credit enhancement of comparable quality, then at the end of that year all of the outstanding principal on the bonds will be due and payable.

Now, the documentation is structured such that if your system is unable to substitute credit enhancers or come up with the funds(!), then the LOC bank must pay the bondholders. This means the bondholders are fully protected (which they must be or otherwise the LOC would truly be useless). But it then means that suddenly your system owes the bank all of the then outstanding principal balance.

As you can imagine, this situation could get very messy. No one likes to be in the position of having to issue new bonds or being otherwise forced to borrow a huge sum of money in a short period of time.

The second difference is that LOC fees are paid annually. In addition, LOC fees are calculated on the outstanding principal balance, not total debt service.

Most LOC fees for water and wastewater systems are in the range of 0.3% - 0.7% of outstanding principal a year. Furthermore, rather than being based on the underlying credit quality of your system, they are based on the legal and financial structure of the system. If the system is

part of a unit of local government with general taxing powers, and if general tax revenues are pledged to the bond payments, then the LOC fee is likely to be closer to 0.3%. If the only revenues which support the bond payments are the water or sewer revenues of the system, then the LOC fee is more likely to be in the 0.7% range.

N.B. This does not mean, if a system has the optimum legal and financial structure, but a shoddy financial history, that a bank will issue an LOC, anyway. It will not. No bank will cover a shoddy credit for any price. The point is just that if a bank does agree to issue an LOC for a system, it will base its LOC fee on structure.

Calculating the total cost of LOC's is different depending whether the bond is a Level Payment Bond or a Level Principal Payment Bond.

If the bond is a Level Payment Bond, the cost of the LOC can be determined by the TIC method. If the bond is a Level Principal Payment Bond, then you must multiply the LOC by the outstanding principal balance in each year, and then discount all of the annual fees back to obtain their total Present Value. Once you have ascertained the Present Value of the LOC fees, you can compare them directly to bond insurance premiums (since they will then both be denominated in Present Value dollars), or determine the LOC's impact on your rate by converting the Present Value dollar amount to TIC.

Calculating Savings on Credit Enhancements.

To calculate the savings on credit enhancements, both bond premiums and LOC fees must first be converted to TIC. For example, using the Level Payment Bond above, the TIC of the AA bond insurance premium would be about 0.09%. In other words, the cost of the bond insurance premium would add about 0.09% to TIC. Now, let us say that your system's FA determines that your bond would sell at a rate of 7.25% without the credit enhancement and a rate of 7.1% with the credit enhancement. Without considering the premium, the savings to your system would be the 0.15% difference in the rates. Since, however, you must pay the fee, you must deduct the increase in TIC due to the enhancement fee from the difference in the two rates. In our example, the difference between the two rates is 0.15% and the increase in TIC caused by the credit enhancement fee is 0.09%. Deducting the increase in TIC from the difference in rates indicates that the real savings to your system is 0.06% in TIC. By reversing the TIC method, you can

calculate the exact amount in Present Value dollars. The exact savings would be \$5,024 on the \$1,000,000 bond.

Now, as you can see, whatever savings there may be depends greatly on the rate at which the credit enhancement trades. For example, based on our example, we saw that at least one AAA enhancer was trading at 7.1%. At the same time, another AAA insurer might be trading at 7.2%. If the second enhancer charged the same premium, there would be no savings at all.

This is the point. There is a fairly wide trading range among all of the credit enhancers, both banks and bond insurers. Your FA should know the trading range of each, or he can easily find out the trading range of each by asking the investment bankers who regularly trade in credit enhanced bonds. Once a particular credit enhancer's trading range is known, you can then ascertain any savings by converting the premium to TIC and subtracting this cost from the difference between the enhanced rate and the rate on unenhanced bonds of your system.

This may sound complicated, but it is not. A good FA can boil the problem down to a few straightforward conclusions such as: Unenhanced rate, 7.25%. Enhanced rate, 7.1%. Potential savings, 0.15%. Cost of enhancement, 0.09%. True savings, 0.06%.

Rating Agency Fees.

This is the simplest cost element to understand. If your system intends to issue a bond, and your FA believes the system has the credit strength to obtain an investment grade rating on such bonds, then he will undoubtedly recommend that the system apply for one. The fee is the cost of obtaining the rating.

This fee is paid directly to the rating agency at the closing. The rating agency fee is a flat fee and it is based on the complexity of the review which the rating agency staff conducts of your system's financial statements and operating history. Fees run from a few thousand dollars for a smaller system with simple accounting procedures and management history, to several tens of thousands of dollars for larger, more complicated systems.

Rating agencies will agree to the amount of fees in advance. It is part of the FA's job to contact the rating agencies on your system's behalf and to negotiate the rating fee. The FA will also be able to guide the system's financial staff through the rating process.

The rating agency staffs are very professional and their reviews are quite rigorous. It is a fair thing to say that, if you apply for a rating, the fee charged by the rating agency will be the least of your worries.

Printing and Miscellaneous Costs.

Managers of water and wastewater systems are well advised to keep cost sheets on each financial alternative available. During each meeting he should list the types and amounts of third party costs involved with each proposal. At the end of each discussion of each proposal, the manager should recite the list of costs to the FA and the other participants and ask directly whether there are any additional costs involved with the particular proposal.

There generally will be some miscellaneous costs. But they should not involve large amounts of money. They should easily be able to be identified in advance. Among the more common types of miscellaneous costs are the following:

- **Cost of printing bond documents.** The document which legally offers the bonds for sale is called the Official Statement, which is abbreviated to "OS." Investment bankers generally have the OS's printed by a professional printer. For simple bonds, this should not run more than \$1,000 - \$2,000.
- **Surveys.** Bankers generally require an updated survey of property which is to be mortgaged. The cost of a survey, which is done by a professional surveyor, can run from a few hundred dollars for a small parcel of property to several thousand dollars for large parcels.
- **Title insurance.** Title insurance is commonly required where a mortgage on land and buildings is involved. The cost of the premium is generally only a few hundred dollars
- **Appraisals.** Again, when real property is involved, an appraisal is often required. If the property has been recently acquired, then only a confirming appraisal is usually required. Not every appraiser will be acceptable. There is a professional designation within the appraisal industry called "M.A.I.", which means Member of the Appraisal Institute. This designation involves a

course of professional study plus continuing education requirements. It is an indication that the appraiser is a professional and that he is aware of recent developments in appraisal standards. As such, most lenders will require an M.A.I. appraisal.

Depending on the size of the property, the appraisal will run several thousand dollars. A confirming appraisal will be about 25% to 50% of the cost of a full appraisal.

* * * * *

The above eight categories comprise the vast majority of financing costs. Each has been only briefly described. The purpose here is to give water and wastewater system managers just a sketch of what each category is to serve as guidance when discussing the project with the FA and the various other advisors.

As has been mentioned several times, the key to controlling and estimating financing costs is the system's FA. He will be able to identify each financing cost you will encounter on any given financing. He will be able to explain them thoroughly. He will assist in negotiating firm, written estimates. And, he will be able to calculate their impact both on annual cost and on total cost.

But before leaving this topic, it might be well to recap some of the categories by providing below, on Table 11-A, a theoretical but thoroughly realistic estimate of the financing costs involved in the issuance of a \$1,000,000 bond to fund a project for a small, but experienced and financially sound system with an A credit rating.

Table 11-A

Financial Advisor Fee	\$10,000
Commitment Fee	N/A
Trustee Fee*	2,500
Underwriter's Counsel	2,500
Rating Agency Fee	3,500
Bond Counsel	6,500
Underwriter's Discount	20,000
Bond Insurance Premium	9,500
Printing & Miscellaneous	<u>2,000</u>
	<u>\$56,500</u>

* Please note the Trustee Fee is \$2,500 for setup plus \$500 a year thereafter.

As you can see the financing costs equal \$56,5000 for a \$1,000,000 bond, or 5.65% of bond principal. By using the TIC tables in Appendix C, you can see that if the interest rate on the bond is 7% and the term is 20 years, the financing costs will increase TIC from 7% to 7.72%.



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Chapter 12

Delay

Every chapter in this book has at least mentioned the concept of Present Value or Future Value. Chapter 3 has an extensive section on the "Time/Value Theory" of money. Throughout this book, the point has been made , over and over again, that value changes over time.

This fact is perhaps the single most important concept in finance. But, despite its paramount importance, it is still a major problem for many people. The problem, I believe, is with the word "concept." People have a tendency to think that "concepts" somehow aren't real. They are right. Concepts are not real.

Charity is a concept. But what about writing a check to the United Way? The act of writing the check to the United Way is called an act of charity. It is, if you will, a physical manifestation of the concept. What, then, are the physical manifestations of the concept of the Time/Value Theory of money? What physical evidence is there that the amount of money you have to pay today for something will be different from the amount of money you have to pay tomorrow?

The best physical evidence lies in your checkbook. How much did you pay for health insurance last year? How much are you paying now? If you rent, how much was your rent last year? How much is your rent this year? If you pay tuition for a child, how much was the tuition last year? How much is the tuition this year? If you add up all of the checks you wrote last year for household expenses, are they more or less than what you are paying this year?

If you are not paying more now, write a book and tell the world how you do it! It will surely be a best seller; because literally everyone pays more from one year to the next.

The cause of this phenomenon is inflation.

When you read about inflation in newspapers or listen to commentators discuss it on radio or television, it seems like a remote abstraction - a concept.

Inflation is a concept, just like charity is a concept. Just like the Time/Value Theory of money is a concept. And, just like charity, it has its own physical manifestations. Unfortunately for us all, the physical manifestation of inflation is that we must pay more and more for the goods and services we need.

As far as water and wastewater systems are concerned, the all-too-real physical manifestation of inflation is that a length of pipe and an hour of labor cost more today than they did last year.

This brings us to the point of this brief chapter. A budget which does **not take the effects of inflation into account is a bad budget**. And, more specifically, a project estimate which does not take into account the effects of inflation is a bad project estimate.

Now, the question arises. How does inflation creep into a project estimate. The answer is: Delay.

Let us say, as an example, that a water or wastewater system's consulting engineer estimates that a particular project will cost \$1,000,000. The date of the engineer's estimate is January 1.

By the time the staff has an opportunity to review the project and discuss it with the board, a month elapses. It is now February 1.

The board decides to proceed. But the board decides the project is too costly to be covered by current revenues and is disinclined to consider a one-time surcharge or levy on the ratepayers. They feel the project should be financed over time. So, the board authorizes the staff to retain the services of a professional Financial Advisor (FA).

The staff prepares a Request for Proposal (RFP). They send the RFP to the system's outside counsel for review. The counsel reviews the RFP and returns it for board action. The board approves the RFP and it is published in the appropriate newspapers. It is now March 1.

The staff reviews the proposals submitted by the various FA's and makes its recommendation to the board. The board approves retaining the recommended FA. It is now April 1.

The FA familiarizes himself with the system itself, its management, its financial history, and, most importantly, the project and its costs. He makes a preliminary recommendation that the project should be financed

with a municipal bond to be issued through the state bond bank. The board approves the preliminary recommendation and authorizes the FA to discuss the project with the state bond bank. It is now May 1.

The FA and the system staff meet with the staff of the state bond bank who encourage the system to proceed with the financing through the bond bank. They tell the system to prepare an official application. The FA and the system staff report the results of their discussions with the bond bank to the board. The board approves the preparation of a formal application to the bond bank. It is now June 1.

The FA, the system staff and the outside counsel prepare the official application to the state bond bank, and the board approves it. The application is submitted. It is now July 1.

The state bond bank notifies the system that their preliminary review is favorable but that an Environmental Impact Statement (EIS) will be required. The board authorizes and approves an RFP for an independent consulting firm to prepare the EIS. It is now August 1.

The staff reviews the proposals from the independent consulting firms and reports their recommendation to the board. The board approves the recommendation and authorizes the hiring of the independent consultant to prepare the EIS. It will take six months to prepare. It is now September 1.

The holidays come and go. The old year ends, and a new year begins. As far as the project is concerned, it is now Year Two.

The independent consultant submits his report. The board reviews and approves the EIS, and authorizes its submission to the state bond bank. It is now March 1 of Year Two.

It takes the state bond bank sixty days for their staff to review all of the project submissions and for their board to approve the issuance of bonds on behalf of the project. It is now May 1 of Year Two.

Under state law, the issuance of bonds requires a public hearing. Thirty days legal notice is required to hold a public hearing.

The notice is prepared by outside counsel and published in the appropriate newspapers. The public hearing is held. It proves to be a blessedly uneventful occasion. But, it is now July 1 of Year Two.

The state bond bank issues bonds only three times a year. It is too late to include the project in the August 1 bond issue, so the bond bank schedules the project for its next bond issue in December.

In December, the bonds are issued and the project funds are placed in the system's bank account. It is now December 1 of Year Two.

The holidays come and go. The new year arrives. It has now been two full years since the original cost estimate for the project.

Assuming the rate of inflation for the intervening two years has been only 4% in each year. The project cost has now climbed to \$1,081,600.

Now, if the system did not take into account the effects of inflation on the project cost, then the system will be \$81,600 short. Imagine what the ratepayers will say at the second public hearing, which the board and the management must then call to explain why the project did not come in on budget, and why, therefore, the ratepayers must suffer an \$81,600 surcharge in order to complete the project! These are the types of situations which all managers and directors seek to avoid.

On the other hand, assume that the cost increase was taken into account and that the size of the bond issue was increased commensurately to cover the increase in project cost. No nasty public hearing will have to be conducted. No public explanations will have to be given. Nonetheless, the fact remains: for no reason other than delay - in this case, perhaps, perfectly legitimate delay - the cost of the project inflated by 8.16%. The project cost the ratepayers \$81,600 more than it would have at the time of the original cost estimate.

As you can see, delay costs money -- even unavoidable delay.

Now, we could go over the above example and conduct a lively debate over whether any of the delays were avoidable. This is not the point.

Now, there are two points to be made here. The first point is: avoid delay. Wherever possible. Delay costs money.

The second point is that, since delay is in many cases utterly unavoidable, be absolutely certain that the delays are estimated as accurately as possible and, most importantly, that the cost of such delays is fairly estimated, as well. This is not only the most prudent course of action to follow, but it will also obviate confrontations with angry ratepayers.

It is an unfortunate fact of life that even unavoidable delays look like mismanagement to the general public. And there are few stories which sell more local newspapers, than "exposes" of "mismanagement" by public officials.

Can delays be accurately estimated? Certainly.

Here's how. Ask the system staff for a schedule of the internal review and approval process. Ask the FA for a schedule of the external review and approval processes. Then get the staff and the FA to combine and integrate these schedules. Next, add some generous leeway, at least sixty to ninety days. Finally, and most importantly, after conferring with your staff, your FA, your engineers, your lawyers and all of the other participants in the project, set a target date for

commencement of the project and let everyone know that you will hold them to their schedules. You might also assign the FA the responsibility for overseeing everyone's schedules and reporting to the board immediately if anyone gets behind.

In addition to all of the above, water and wastewater system management must also be aware that different financial alternatives have different delay factors. One financial alternative will always take more or less time than another to implement.

For example, let us say that in the above example, the FA estimated that the system could issue its own municipal bond. Let us say that by doing so, a full year's delay could be avoided. In such case, our system would have been able to save \$41,600.

Perhaps.

But what if the system were able to save itself \$50,000 of financing costs by going through the state bond bank (which is often the case)? Then, it would be wiser to proceed with the financing through the state bond bank.

The point here is that delays can be estimated. The cost of such delays can also be estimated. In addition, once the costs of various financial alternatives have been identified, they can be compared and a prudent decision, based on sound financial principles, can be made. Furthermore, without considering the cost of such financial alternatives, any decision made will be, by definition, defective.



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Chapter 13

Imposed Costs

Imposed costs are those costs which are extrinsic to the water or wastewater project, per se, but which are required as a condition of financing the project by a particular lender or a particular financial program.

In the preceding chapter, there is an example which describes a project funding through a state bond bank. The example recites the fact that the state bond bank requires an Environmental Impact Statement (EIS) as a condition of funding. This a perfect example of an imposed cost.

Chapter 12 was concerned with the delay caused by having to obtain the EIS. This chapter will concern itself with the cost of having to obtain the EIS, as an imposed cost. In other words, as far as this EIS is concerned, there are two types of costs associated with it. The first is the cost of the delay caused by postponing the financing of the project until the EIS is completed and approved. And the second is the cost of paying for the EIS itself. This chapter will concern itself with this latter type of cost, as well as the other types of imposed costs which are present in virtually all alternative financial programs.

Unfortunately, trying to list all of the possible imposed costs in various alternative financing programs is like trying to list all of the possible things which might go wrong with a project. The list is not infinite; but there are so many variables that trying to catalogue them is unproductive.

Rather, this chapter will concentrate on identifying the major categories of imposed costs as well as identifying where they are most likely to crop up in various financing programs.

We can begin this discussion by creating a new axiom of finance, as follows:

The more government regulations are involved in any financing program, the more that program will contain imposed costs.

In saying this, we create a spectrum of all financial alternatives. At one end of the spectrum are the least regulated programs, which contain the fewest imposed costs. At the other end of the program are the most regulated government programs, which contain the largest number of imposed costs.

Let us begin at the end of the spectrum with the fewest imposed costs. As we move on, however, please note that we will not always be moving from Program A to Program B, and so on. Our purpose here, in this chapter, is not to rank financing programs in terms of the number of imposed costs. We are not going to score the various alternative financing programs. Rather, we will start with the simplest types of imposed costs and work through the more complex and subtle forms of imposed cost, regardless of whether any particular imposed costs falls within any one program or another. In addition, the fact that a certain type of imposed cost is mentioned in conjunction with only one financing program is not meant to imply that it is absent from all other programs.

Having said that, the most common imposed costs, which water and wastewater systems are likely to face, are found in conventional loan transactions with commercial banks, as well as just about all other financing programs. They are:

Most Common Types of Imposed Costs.

- A survey of any land which is to serve as collateral for the loan.
- The appraisal of real property which is to serve as collateral for the loan.
- Title insurance which guaranties to the lender that the owner's legal interest in a property is valid and enforceable.

There is nothing new about any of these costs. What is new, perhaps, is the consideration of such costs as imposed costs. But, in fact, that is what they are.

These costs are extrinsic to the project. In and of themselves, they have absolutely nothing to do with providing fresh drinking water or disposing of wastewater. Rather, they are costs which a water or wastewater system must incur to prove to the lender or provider of funding that it owns all the property it says it does (the survey), that its property is worth what it is supposed to be (the appraisal), and, that its ownership interest is legal and valid (title insurance). In other words the system must incur these costs because the lender or provider of the funding says so. The lender imposes the requirements of survey, appraisal and title insurance on the borrower, and the borrower must pay the costs of meeting these requirements. Yet, they have nothing to do with water or wastewater.

These particular imposed costs - survey, appraisal and title insurance - are now so common that they should almost be considered financing costs. In fact, as you may have noticed in the last section of Chapter 11, entitled "Printing and Miscellaneous Costs," they were, in fact, listed as financing costs.

The point here is not what name or label we attach to these costs. Rather, it is that they exist. They must be paid. If you would rather think of them as financing costs, go ahead.

Adverse Refinancings.

Another more subtle type of imposed cost involves the adverse refinancing of an existing debt. Here is how this type of imposed cost arises.

Let us say a water or wastewater system already has a \$1,000,000 mortgage on its real property as a result of the financing of a previous project. Let us also say that this same system now has another \$1,000,000 project which it must also finance. The problem arises from the fact that both lenders want first mortgages. Neither will subordinate. Neither will permit a parity mortgage. What can be done?

In such case, the system must refinance the first mortgage. This means that the system will increase the amount of the new project financing to include the outstanding principal balance of the old mortgage, plus any interest due, plus any prepayment penalties due. At closing, the system will pay off its old mortgage, so that the new lender

(assuming, of course, that he agrees to it) will be the sole first mortgagee, albeit for a much greater dollar amount.

This type of forced refinancing can result in additional imposed costs in two ways. First, there may be prepayment penalties. Second, the terms and conditions of the refinancing may be less favorable and more expensive than the existing mortgage.

Either eventuality results in higher costs to the water or wastewater system. And the higher cost can be considered an imposed cost because the event which created the additional cost, i.e., the refusal to subordinate, was one of the terms and conditions imposed by the new lender.

Audits.

Probably the next most common form of imposed cost is the requirement for audited financial statements. Now, for many water or wastewater systems, especially the larger ones, the cost of an audit is moot since they normally have their financial statements audited, anyway. Yet, many systems do not have audited financial statements. They may manage to get along famously without audited statements and they may have maintained excellent financial records. All of this good work will come to no avail when it comes time to finance a capital improvement project. There are a few government financing programs - notably the Farmers Home Administration's Water and Waste Disposal Program - which exempt the smallest systems from the audit requirement. But virtually all other financing programs and all other lenders require the borrower to provide audited financial statements.

(N.B. Lenders may waive an audit requirement in the first year only for systems which have never had audits before. But they will require that such systems obtain audits in the future.)

Imposed Costs Inherent in Municipal Bonds.

The next area to review is municipal bonds. As you know, the interest on municipal bonds issued by water or wastewater systems, which are, or are a part of, a unit of local government, is exempt from income taxation by the federal government and by almost all state governments. As such, as you might guess, the issuance of such bonds

is regulated, and heavily regulated, by the federal government through the Internal Revenue Code (IRC).

You already know from Chapter 11 that the issuance of municipal bonds requires both a bond counsel and a trustee. Since a municipal bond cannot, under most circumstances, be issued without a bond counsel or a trustee, some would argue that the requirement to have both a bond counsel and a trustee should be classified as imposed costs. Perhaps so. But, again, it is not the nomenclature or the category which is important. Rather, it is the identification of the cost as a cost that is important, as well as the proper inclusion of such costs in the total project cost estimate.

Most of the rules in the IRC governing the issuance of municipal bonds relate to the question of whether the interest on such bonds is, in fact, entitled to the exemption. This in turn begets questions about such matters as the issuer's legal status (as a unit of local government), the purpose of the bonds, how the bond proceeds will be used, when the bond proceeds will be disbursed, as well as how any repayments, reserve funds or undisbursed bond proceeds will be invested. Many of these rules concern the infamous concept of "arbitrage." Arbitrage, in general, refers to the happy circumstance of investing the proceeds of a loan, such that you are earning more interest on your investment than you are paying in interest on the loan. Since the low interest rates on municipal bonds are a direct result of the exemption from taxation, the federal government is zealous to guard against abuse of the exemption by arbitrage. The mechanism they have devised for doing so is the promulgation of voluminous regulations to cover virtually all possible permutations of events surrounding the issuance of a tax-exempt bond.

Some of these regulations, as you might imagine, result in imposed costs on the systems which issue the bonds. Although there is an exemption for very small and infrequent bond issuers, most water and wastewater systems, for example, will be required to set up elaborate accounting mechanisms to track the interest earnings on all unexpended bond proceeds in order to comply with the IRC regulations against arbitrage. These tracking systems are often managed by the trustee. In addition, the results of such accounting will have to be reviewed by the bond counsel every year to assure compliance. Regardless of how perfunctory these reviews may become, they still require time and effort on the part of the trustee and of the bond counsel. And, as you know, the time and effort of any professional cost money. But regardless of who performs these services, they still constitute an additional cost, extrinsic to the project, which is imposed by the IRC.

Another such cost, is the cost involved in holding a public hearing, if one is required.

In an effort to guard against the privilege of the tax-exemption's being extended to non-governmental entities, the IRC provides that if more than 5% of the proceeds of a bond issue goes to benefit any private business concern, then the bond issuing system must hold a public hearing on the question. This rule affects many, many water and wastewater systems. This is because many such system's private business customers provide more than 5% of the system's revenues. In such case, the system is required to hold a public hearing. And, although the holding of a public hearing does not usually involve a great deal of money, in and of itself, it also involves a delay of about sixty days.

So, between the cost of the delay and imposed costs of the notice publications and the hearing itself, the imposition of this requirement is no small matter.

Finally, as we leave tax-exempt municipal bonds, we now proceed across the spectrum into the realm of the financing programs with greater numbers of imposed costs. This is the arena of government programs, where imposed costs truly abound.

Of all of these, the two most infamous imposed costs which appear in government project finance programs are the so-called Davis-Bacon Act requirements and the previously mentioned requirement for an Environmental Impact Statement (EIS).

We have already discussed the EIS requirement both here and in Chapter 11. We have seen that it involves both the cost of delay and the imposed cost of the preparation of the EIS itself. We have seen that the preparation of the EIS can take six months. At the prevailing rate of inflation, this delay adds about 2% to the cost of a project, or \$20,000 to a \$1,000,000 project cost. This alone is significant. But when the imposed cost of preparing the study, which for even a small project can easily run between \$5,000 to \$25,000, is added to the cost of the delay; it is clear that the EIS requirement can constitute a major component of total project cost.

The Davis-Bacon Act requirement does not cause delay; but it is perhaps the most significant of all the imposed costs.

The Davis-Bacon Act is a statute which was enacted by Congress to provide that all federal projects paid the prevailing union wage to all construction workers on the project. In addition to purely federal projects, i.e., the public works projects of the federal government itself, the act also applies to several types of project finance programs which the federal government administers or sponsors. As you will see in

Chapter 20, one such program containing the Davis-Bacon Act requirement is the State Revolving Fund (SRF) program, sponsored by the U.S. Environmental Protection Agency.

The problem with the Davis-Bacon Act is its impact on small, rural water and wastewater systems. The problem arises from the fact that union scale wages are higher than non-union scale wages. Furthermore, most union labor is clustered in cities, where the cost of labor, in general, is higher than it is in the countryside. So, the effect of all this is that the cost of union labor is higher than the cost of urban non-union labor, which, in turn, is higher than the cost of rural labor.

Thus, for a rural water or wastewater system to comply with the provisions of the Davis-Bacon Act often requires it to pay wages which are significantly higher than the prevailing wage in the local community. These added wages constitute an imposed cost in the truest sense of the word.

To give you an idea of just how much of an increase the imposition of the Davis-Bacon Act requirements can add to the cost of a project, a regional coordinator for EPA estimated in 1990 that for his region, the imposed cost of having to pay Davis-Bacon wage scales added between 5% to 20% to total project cost!

Consider this for a moment. The gentleman did not say that the cost of labor increased by 5% to 20%. Rather, he said that the total project cost increased by 5% to 20%. This is an astonishing number. For a \$1,000,000 project, this means an imposed cost increase of between \$50,000 and \$200,000.

The lesson of this story is clear. If the labor component is a major part of the total cost of your system's project, then the imposed costs of the Davis-Bacon Act requirements may so burden the project that other, alternative non-governmental programs, or even governmental programs without the Davis-Bacon Act requirements, become far more cost effective.

As you can see, imposed costs can have subtle forms and effects. At first blush, who would think that an EIS requirement could add from 2.5% to 5% to total project cost? What manager of a water or wastewater system is there, who, after reading the legal boilerplate about having to pay wage scales consistent with the provisions of the Davis-Bacon Act, would ever dream that these few simple words could add as much as \$200,000 to a \$1,000,000 project cost?

Before concluding this chapter, let me say that if the little stories about the EIS and the Davis-Bacon Act have not given you pause, consider this: The Davis-Bacon Act requirements are one of the

mandates of the USEPA's SRF program. There are sixteen other such mandates.

The conclusion here is that imposed costs are not only real costs, they can be extremely significant costs, as well. In order to avoid being caught out on a limb by any imposed cost on any program, be certain to ask the question: what requirements must our system agree to in order to obtain the funding through this program? Ask this question of yourself as you read through information on any financing program. Ask the question of the FA. And, ask the question of the staff of each financing program.

Once you have ascertained that you will have to agree to do something, your staff and the system's advisors can estimate the cost of doing it and, if applicable, any delays which will ensue.

Once all of these costs have been identified and measured, they can be factored into the total cost of alternative financing programs. The alternative financing programs can then be compared, and a decision can be made based on sound financial principles.

Chapter 14

Ineligibility

Ineligibility refers to those costs which simply cannot be financed, either as a matter of law or a matter of policy, through a particular financing program, whether public or private.

In the last chapter dealing with imposed costs, we mentioned that such costs could be quite subtle. We noted that an imposed cost could easily be concealed among the many terms and conditions of a particular financing program.

This is doubly true of ineligible costs.

In fact, ineligibility is a far more insidious cost category because, in most cases, the only items which are listed in any program description are the eligible costs. There is no list of ineligible costs. Therefore, in order to determine which of the cost items of a given project, if any, are ineligible, you would literally have to sit down and match each cost category involved in the project with the list of eligible costs for any particular financing program.

The point here is that when you see the concept "Eligible Project Costs" in literature describing a financing program, you must be aware that it has a hidden counterpart called "Ineligible Project Costs." These ineligible costs still have to be paid for, even if they cannot be financed through a particular program.

In addition, every program, whether public or private, has ineligible costs. There are two broad categories of such ineligible costs. They relate to quantity or quality.

Quantitative ineligibility means that a percentage of a given cost category cannot be financed.

Qualitative ineligibility means that the entire cost category, itself, cannot be financed.

Let us begin with a look at quantitative ineligibility.

Quantitative Ineligibility.

Anyone who owns a home is familiar with quantitative ineligibility. It is the amount of the down payment.

Banks will not (or are, at least, not supposed to) finance 100% of the purchase price of a home. Bank regulations generally prohibit the financing of more than 80% of the value of a home, or more than 95% of the value of the home, if the owner purchases Private Mortgage Insurance. (There are some exceptions for veterans, first time buyers and others.) In other words, between 5% and 20% of the cost of the home is quantitatively ineligible under conventional bank mortgage lending programs.

Did you ever think of it this way? Did you ever think of a downpayment as an ineligible cost?

But, as you can see, the downpayment truly does represent an ineligible cost.

Is this really any different than if banks put signs outside their doors which said: No Kitchens Financed? Aren't both of these prohibitions just variants on the same point of principle: that you cannot finance all of the house?

No. In fact, there is a difference between only financing 80% of a house and not financing kitchens. The former is an example of quantitative ineligibility, and the latter is an example of qualitative ineligibility.

There is a very good reason why the bank will not finance 100% of a house. The reason is liquidity. If you defaulted on your mortgage, the bank would want to foreclose on the house and then sell it as fast as possible. If the bank had loaned you 100% of the purchase price and you defaulted on your mortgage after the real estate market declined 10%, or even 5%, then the bank would have a difficult time recovering the full amount of its loan in a timely manner. In other words, the bank might have to wait quite a while to get all its money back. Its loan would be illiquid.

On the other hand, if the bank only loaned 80% on the house and you defaulted under the same conditions, the bank would, theoretically at least, have no difficulty recovering the full amount of its loan right away.

Thus, as you can see, in the case of a home mortgage, an 80% loan is more liquid than a 100% loan.

This is, in fact, a general rule: the lower the loan-to-value ratio, the more liquid the loan. This means that the less a bank lends against collateral of a certain value, the greater is the likelihood that the bank will make a full and timely recovery on that loan.

As you might imagine, this rule is responsible for a great deal of quantitative ineligibility.

Some examples of quantitative ineligibility which relate to water and wastewater systems are the following loan-to-value ratios for various types of assets. Please note that loan-to-value ratios always express the positive, i.e., eligible amounts. The ineligible amounts are the reciprocals of these values. So, if 80% of a cost is eligible, then 20% is not.

- Raw land: 50%.
- Buildings, machinery and equipment: 75%-80%.
- Inventory or other disposable assets: 60%-70%.

Qualitative Ineligibility.

Qualitative ineligibility, as you will see, means that the particular financial program you have chosen to finance your system's project will not permit certain categories of costs to be included. The implications of this, at first, can be quite subtle; but they can sometimes be quite dire.

Say, for example, that two years ago your system was offered an extensive piece of property, at an extremely attractive price, on which to drill a series of new wells. In addition to the land that was absolutely necessary, the system's board decided to buy a considerable amount of surrounding acreage. They felt this was the most prudent course of action. On the one hand, the additional acreage might be needed for future wells, if the system's needs expanded. But, on the other hand, even if the system didn't need any further wells, the additional acreage would assure good wellhead protection for the original well field. So the board went ahead and bought the property and financed it with a short-term bank loan. The bank would only lend 50% of the cost of the land, but let us say that the owner of the property would accept a subordinated note, or second mortgage loan, for the balance.

The board's intention was to roll the acquisition of the land into a much larger project which would involve drilling the new wells, adding

new storage capacity, as well as connecting the new well field to the system itself.

Let us now assume that they have completed all the planning and the engineering studies as well as the design of the new improvements. They are now ready to finance the entire project.

Unfortunately, the board now learns that most of the land can't be financed through the program they have chosen. The program they have chosen allows the system to pay for the project over a twenty-year period, but it will only permit land costs to be included in the project to the extent of the minimum acreage required for the wells themselves. In other words, no credit will be given for wellhead protection, and no credit will be given for future expansion.

At first this does not sound so drastic. After all, they already have interim bank financing as well as financing from the previous owner. So what if the majority of the land cannot be financed through the program the board had chosen. How hard can it be to get additional financing for the extra acreage?

Well, consider this. The bank and the previous owner might have been very happy indeed, to give the system an interest-only bridge loan for a couple of years on the land. They did so in anticipation that the loan would be repaid in its entirety in a year or so when the full project was financed. Now both the bank and the previous owner learn that most of the land will not be financed with the project. Now they are being asked to finance it. And, what is worse, they won't even have mortgages on the full property, since part of the mortgage must be split off as security for the part of the land that is being financed through the financing program.

The bank decides it won't give the system a loan for more than five years and at a very substantial rate, on the excess acreage. The previous owner will only offer the same terms.

The point here is that the ineligibility of a project cost, such as the excess acreage, means that that particular cost must be paid for by some other means. Perhaps, such costs can be paid for by another financial program. Perhaps, no one will finance them. If no one will finance these costs, then they must be absorbed directly by the ratepayers in the form of a one time assessment.

The effects of an ineligible project cost on a water or wastewater system may be quite mild, especially if the cost is small and there is a reasonable alternative readily available. But, on the other hand, if the ineligible cost is large and there is no alternative available, you might well have some angry ratepayers who are forced to come up with a large

sum of money on a one-time basis. In any event, as we shall now see, ineligibility will result in adverse consequences to system ratepayers.

Cost of Ineligibility.

Let us assume, as an example, that out of a total project cost of \$1,000,000 to be financed through a 20 year loan at an interest rate of 7%, only \$900,000 is eligible. The balance of \$100,000 represents the cost of the excess land. Let us further assume that the remaining \$100,000 will be financed by a bank and by the previous owner at a 10% rate, but that it must be paid off in five years.

Now, from our tables in Appendix C, we can determine that the annual debt service payment on the \$900,000 loan at a 7% rate for a 20 year term would be \$84,954. The annual debt service payment on the \$100,000 loan at a 10% rate for a 5 year term would be \$26,380. The system's combined annual debt service payment would, therefore, be \$111,334.

If the system had been able to finance all \$1,000,000 through the financing program, the annual debt service payment would be only \$94,393. Therefore, because the excess land is ineligible for the program, the cost to the system's ratepayers increases from \$94,393 to \$111,334 - an increase of 18%!

Please note that the above example illustrates qualitative ineligibility. As you recall, the under the financing program chosen by the system's board, excess land is an ineligible cost category. The result of this exclusion, however, is that \$100,000, or 10%, of the total project cost cannot be financed through the program.

Question. How does the above example differ from a financing program which will only fund 90% of a project? Where 10% of project costs are quantitatively ineligible.

The answer is: it doesn't. There is no difference. The effects of qualitative ineligibility and quantitative ineligibility are the same. They both result in higher cost to the ratepayers.

The reason for creating a distinction between qualitative and quantitative ineligibility is simply to emphasize the fact that these hidden costs lurk in two areas. On one hand, when a program description says "80% financing", then system management must realize that they must get the remaining 20% from another source. On the other hand, when a program description says "no excess land," or more probably, "only

land necessary to maintain wellhead," then the system must find another source of funds to pay for the balance of the land it wants to purchase.

Furthermore, when you read the words "another source," you should be thinking "another (expensive) source." Financing small pieces of projects can be very costly. If you decide to pursue a 90% financing program, for example, for your water or wastewater project, do not kid yourself into thinking that your work is 90% done. It has only just begun. Putting the last 10% of the funding together will prove to be far more arduous than arranging the first 90%. And more expensive.

The reason that ineligible costs are so expensive to finance is that, as you saw in the above example about the excess land, they relate to things which are, most often, only part of a greater whole, or a fraction of something. In some cases, the ineligible portion might not even be a real thing in its own right - such as 20% of a house. What can you do with 20% of a house?

The point here is that the part of the project cost which is ineligible in any given program will, by its very nature, be difficult to finance. When something is difficult to finance, it will also be expensive to finance. Second mortgages carry higher rates than first mortgages. Second liens are more expensive than first liens.

In our example about the excess land, the parcel would first have to be divided into the eligible and ineligible parts. New surveys would have to be done. New deeds would have to be created. In addition, since one of the principal reasons for acquiring the excess acreage was wellhead protection, it is most likely that the deed to the ineligible acres would contain restrictions against uses inconsistent with wellhead protection. The more restrictions there are in a deed the less valuable is the land. The less valuable the land, the more difficult and expensive it will be to finance. In short, the ineligible portion of a project will be both more difficult and more expensive to finance.

So, to conclude this discussion about the effects of ineligible costs, there are two points to consider.

First, be sure to identify all of the elements of the cost of your system's project and then match them to the eligibility criteria of each financing program you are considering. Be sure to look for both quantitative and qualitative eligibility criteria.

Second, before you commit to any financing program, be sure to identify alternate sources of funding for all of the ineligible costs. Be sure to do this in advance. One of the worst things that can happen is to commit to a particular financing program, only to learn later that the remaining ineligible costs cannot be financed at all.

Chapter 15

Coverage Ratios

The two preceding chapters of this book note that both imposed costs and ineligible costs often take subtle forms. They are often concealed or difficult to identify.

The cost of "coverage" is the most subtle of all. It is so because, although it is a cost, it is not an expense.

This may seem a cryptic and tiresome remark; but it is true. The ratepayers have to pay the cost of coverage to the system; but the system does not use the money to make debt service payments.

Let us begin to explain this phenomenon with a definition of "coverage." Coverage is the amount by which a system's net income or cash available for debt service exceeds the system's annual debt service payments.

(The term "cash available for debt service" has a very precise meaning. Please see Chapter 1, where there is a discussion of the precise categories of both income and expense which comprise the term "cash available for debt service.")

Coverage is always expressed as either a ratio or a percentage. It is also commonly referred to as the "debt service coverage ratio."

So, for example, if a water or wastewater system has, in any given year, \$125,000 of cash available for debt service and annual debt service payments of \$100,000, then it has coverage of 125%, or a debt service coverage ratio of 1.25 (i.e., 1.25:1).

Now that we know what coverage is, let us look to why it is such a subtle and invidious form of cost.

Let us assume, in our little example above, that the operation and maintenance expenses for this obviously smaller system comprise 50% of the system's budget. And, let us also assume that annual debt service payments comprise the remaining 50% of the system's budget. In such a circumstance, the annual budget would be composed of \$100,000 of annual debt service payments, as indicated above, and \$100,000 of operations and maintenance expenses, for a total of \$200,000.

But, let us also say that the system's lender requires a debt service coverage ratio of 1.25. In such case, the system would have to collect another \$25,000 from its ratepayers.

This means that the total charge to ratepayers would be \$225,000.

A Financial Statement for such a system would look something like Figure 15-A, below:

Figure 15-A

Regular Income	\$225,000
Operations & Maintenance (i.e. cash) Expense	<u>-100,000</u>
Cash Available for Debt Service	\$125,000
Annual Debt Service Payment	<u>-100,000</u>
Net Income (Loss)	<u>\$25,000</u>

Please note the line "Net Income (Loss)," in the above example. The amount of funds listed on this line can be interpreted as the amount of revenues which are collected from the system's ratepayers, but which are neither used for operations & maintenance nor annual debt service payments. As such, the question then arises as to what these funds are used for?

The answer is both nothing and anything. In other words, such funds may be used for any lawful purpose. Or, they may also simply be put into a bank account, and not used at all.

The point here is twofold: first, the funds are excess funds; and, second, the amount of the funds is mandated. In other words, the funds are not absolutely necessary to run the system. This does not mean that such funds will not be used for good and proper purposes. For example, they might be used for preventive maintenance. They may be saved as a reserve fund for replacement and repair of equipment. They may also

be saved in an account and used to prepay loans or other debts of the system.

So, the point here is not that these extra funds are squandered or wasted. Rather, it is just that they are not absolutely necessary to run the system.

What if, since the funds are not absolutely necessary, the board of directors decided to reduce rates by \$25,000? This leads us to the second point.

The board cannot, realistically, reduce rates by \$25,000. The reason for this is that the additional funds must be collected pursuant to the agreement with the system's lender. In other words, the board could reduce rates. It is within their legal authority to do so. But, if they did so, and the debt service coverage ratio fell below the amount required by the lender (in this case, assume the lender requires a debt service coverage ratio of 1.25.), the system would be in technical default of its loan agreement.

(A "default" generally occurs on a loan when the borrower fails to make a full and timely payment under the loan agreement. A "technical default" occurs when the borrower fails to comply with any of the other terms and conditions of the loan agreement.)

So, if a board reduced rates to the point where the debt service ratio fell below the amount agreed to in the loan agreement, the lender could go to court and force the board to increase rates to maintain the required debt service coverage ratio.

This seldom happens. Responsible boards do not willfully violate signed agreements. But what does happen -- and with some frequency -- is that from year to year the cost of operation & maintenance will rise with the rate of inflation; and boards do not correspondingly raise their rates. After two or three years, these systems find themselves seriously in violation of the debt service coverage covenants of their loan agreements. The bankers will always be watching the system's annual financial reports. Once they become alarmed that expenses are increasing and revenues are not rising apace, they will realize that their debt service coverage ratios are eroding and their lawyers will soon be on the system's doorstep.

Another problem which arises with some frequency is the unforeseen maintenance expense. If the system has no reserve account out of which it can pay for such extraordinary expenses, then it will have to pay for the unplanned cost out of current income. This will show up on the annual financial statement as a reduction in Net Income, which in turn will mean a reduced debt service coverage ratio. If this happens a couple

of years in a row, or in two out of three years, the bankers will soon be at the door wanting to know why, and wanting the system to raise its rates to make certain that the debt service coverage ratios are adequately maintained.

So, the point we made a few paragraphs above is not so precious, after all. Coverage really is a cost, but it really is not an expense. It is a cost because the funds to provide the coverage actually come out of the pockets of the ratepayers. But it is not an expense because these funds are not spent on the project. They may not even be spent at all; but they still have to be collected under the terms of the loan agreement. So, the ratepayers must pay for coverage.

Now, how often does the question of coverage come up? The answer is: with growing frequency.

For example, let us say that a water or wastewater system originally financed itself with a loan through the Water and Waste Disposal Program of the Farmers Home Administration. Let us say that the system now wants to do a major upgrade of the entire system. This means that the assets used to collateralize the original loan will have to be used to collateralize the second loan, as well. Under these circumstances, the system will be surprised to learn that one of the major terms and conditions of the second loan will be that the system must now maintain a 1.2x debt service coverage on both loans.

In like manner, take the case of a system which has grown steadily over the years from a very small to a very solid, mid-sized entity. At the same time, this system has enjoyed superb management which has operated the system in a sound and fiscally conservative manner. During its early years it could only get credit through government programs. Whenever it had to go to a bank to finance vehicles or other light equipment, it had to pay very high rates. Now, after years of this travail, it has finally achieved fiscal independence. It is now going to receive a credit rating of "A" from Standard & Poor's. Now, it will be able to borrow funds virtually anywhere. Now it will no longer be a slave to government programs or to the local banking community.

What a shock it will be to the system's directors when they learn that after their years of toil and diligence, that in order for their bonds to be awarded the coveted "A" rating, they will have to maintain a 1.25x debt service coverage ratio. The system's ratepayers might actually wind up paying higher rates because of their system's success.

The point here is that coverage ratios cost ratepayers money. The other point is that requirements for various coverage ratios come from a variety of financial programs. They are not limited to private sector

financial programs; government programs may require them, as well. In addition, as can be seen from the above example of the system which just received its "A" rating, coverage requirements are not limited to poor or small or even new water or wastewater systems. They can be imposed, and are imposed, on systems with varying financial health and histories.

In summary, coverage -- or more properly, excess coverage -- is not a project cost per se, nor is it a financing cost per se. Rather, it is a legal requirement imposed on a borrower by a lender. Its causes may vary widely from government regulation to simple bank policy. Nonetheless, regardless of the cause, the effects of excess coverage requirements are to increase costs to ratepayers of water and wastewater systems across the country.



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Section III



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Chapter 16

Public and Private Funding Programs

Public and Private Funding Programs.

The first section of this book explained what annual debt service payments actually are. It also described how to convert dollars into rates and rate increases into dollar increases so that sense could be made out of the competing claims of various financing programs.

The second section of the book presented and described seven of the most important factors which can inflate project cost.

Section Three will now present the four most commonly used programs to finance water and wastewater projects.

It is important to note at the onset that the following four chapters will not attempt an exhaustive description of each of the four financing programs. Rather, each program will only be described in brief terms.

You may recall from the Introduction to this book that its purpose is to serve as a handbook - a reference book which can sit in the bottom desk drawer for months or even years until a project needs to be financed. Furthermore, between the time I write these words and the time you have a real, live project and really need to read them, at least one major change will have likely occurred in most of the programs, which would have the effect of rendering the information in this book obsolete.

So, the real thrust of Section Three is not simply to present these financing programs, but rather to present them in terms of the seven critical cost factors described in Section Two of this book.

In other words, as far as the government financing programs are concerned, you can pick up the telephone and request exhaustive amounts of information on all aspects of such programs. What information you do not get in the mail, your lawyer can look up in the county law library.

For the non-formal financing programs, such as conventional bank loans and municipal bonds, as much background information as you will ever want to see will be available through your system's Financial Advisor.

What you will not get from any government agency or any library is a breakdown of each financing program into the seven critical cost factors described in the preceeding seven chapters. Nor will they show you how to convert dollar costs to rate increases, and vice versa. And, most importantly, they will not show you how to identify and compare the real costs involved in alternative financing programs.

It should also be emphasized that the analytical methodology contained in Section One of this book and the seven critical cost factors described in Section Two of this book are not confined merely to the four financing programs described in Section Three of this book. On the contrary, both the methodology and the cost factors apply to all financing programs, both public and private.

So, if there is a statewide program or a local financing program for water or wastewater projects in your area, both the methodology and the cost factors in Sections One and Two of this book will absolutely apply to those programs and any others, as well.

Therefore, the next four chapters will each cover one financing program; but they will do so by discussing which of the seven cost factors apply to that program and to what degree.

The financing programs to be discussed are:

- Municipal Bonds.
- Conventional Bank Loans.
- The Water and Waste Disposal Program (WWDP) of the Farmers Home Administration (FmHA) of the U.S. Department of Agriculture (USDA).
- The State Revolving Fund Program (SRF) of the U.S. Environmental Protection Agency (USEPA).

The first two programs, as you know, are part of the private sector. The last two are government programs.

Government funding programs involve public money. Tax dollars cannot be left to the professionalism of individual bankers nor to the integrity of the capital marketplace. Public funds must have safeguards. And the safeguards must be built into the program.

In like manner, although the reason the Congress created a particular funding program undoubtedly fulfilled a single social purpose, the Congress never does things in a singular manner. Whenever they create one piece of policy, they want it to jibe with their other major pieces of social policy as well.

As such, you should not be surprised to find that the government funding programs are replete with rules and regulations which are largely absent from the private funding programs.

(It should be noted that although Municipal Bonds are funded from the private market, they are, because of their federal income tax exemption, heavily regulated by the United States Treasury.)

In other words, if you want to borrow money from the government, you must obey their rules about civil rights, environmental protection, historical preservation, and so forth. Some of these policies result in nothing more than a requirement to fill out another form. Some, however, not only cost money but, as you will see, they cost real money.



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Chapter 17

Municipal Bonds

The issuance of municipal bonds enables water and wastewater systems to raise the funds necessary for capital improvement projects directly from the investing public. In the most literal sense, by issuing municipal bonds, a water or wastewater system can borrow the funds it needs directly from tens or hundreds, and, for larger bonds, even thousands, of small investors.

This transaction is made possible by the presence of the investment banker. It is the investment banker who serves as the intermediary between the many investors who provide the funds and the systems which use them.

A system which wishes to issue municipal bonds must negotiate the terms and conditions of the bonds directly with the investment banker who acts on behalf of the investors who purchase the bonds.

There are two reasons why investment bankers serve well in this capacity. The first is that investment banking is not an unsupervised activity. Uncle is watching. Investment bankers are regulated both by the United States Securities and Exchange Commission (SEC) and by either one of the major stock exchanges or the National Association of Securities Dealers (NASD). The second reason is that if they do not know what they are doing, they will go broke. In other words, an investment banker must be familiar with the general terms and conditions which the investing public will accept. If he makes a mistake and permits unacceptable conditions to be included in the transaction, then there is a strong likelihood that when he goes to sell the bonds to the public, they will not purchase them. The investment bank will be stuck

with unsaleable bonds. The nice young investment banker who puts his firm in this unenviable position is due for an abrupt career change.

Why should water and wastewater systems be interested in issuing municipal bonds? The answer is: low rates of interest. The reason for this is that the interest on the bonds is exempt from federal income taxation and is exempt from income taxation in most states. Because investors do not have to pay income taxes on their interest earnings, they are willing to accept a lower rate of interest. This means that water and wastewater system will wind up paying less interest on their borrowings.

There is one other point which should be made about the municipal bond market. When we speak of the "investing public," we are actually talking about two distinct markets. The first market really is the public. It is you and me and Aunt Millie.

Investors like us commonly invest a part of our savings in municipal bonds because, in general, they are good, safe investments. And, as you will see in a few paragraphs, they generally carry quite favorable rates of interest.

The other distinct market is what is known in the public finance world as the "institutional market." The institutional market consists of large corporations and funds which desire the tax exempt income. The institutional market is distinct from the public market (which is also called the "retail market") because the goals and objectives of the institutional market are distinct from those of the vast majority of individual investors. We will discuss this a little further below when we talk about Rate and Term.

Suffice it to say that the most attractive features of issuing municipal bonds are the low interest rates, and, as we will see, the relative ease with which they can be issued.

Now, however, we will look into the seven cost factors as they apply to tax-exempt municipal bonds.

1.) **Term.** Municipal bonds have by far the most flexible terms. A water or wastewater system can issue bonds with terms ranging from less than a year to forty years. Service life of assets is, however, a factor in determining term. The term of a bond is generally limited to the service life of the asset it finances.

In addition, the market itself has a bearing on term. By this we mean that there are large numbers of both individual investors and institutional investors who will generally buy bonds with terms of up to twenty years. Beyond twenty years, the individual investors tend to disappear from the

market. After twenty-five years, there are almost no individual investors left in the market, at all. What is left are the institutions. The institutions know that the market for bonds with over 25 year terms is very thin. They therefore demand higher rates.

For bonds with terms of 35-40 years, there are literally only a handful of major national institutions left who will purchase such paper. They all know each other. They are all bloodless professionals. So, they will charge to the hilt.

The difference in the annual debt service payments between a twenty-year bond and a forty-year bond is about 22%. But the premium in higher interest rates, which the handful of forty-year buyers will want, may well eat up a good portion of that savings. When comparing twenty-year bonds with lower rates and forty-year bonds with higher rates, be sure to use annual debt service payments as the basis of comparison. By doing so, you will be able to precisely identify the financial advantages of going either way.

The credit rating of the bond also effects term. Whereas the market for investment grade rated bonds truly does extend out to forty years, the market for unrated bonds carries far shorter terms. All but the most sophisticated institutional investors (who will charge exorbitant rates) are reluctant to leave their money in an unrated investment, where the issuer is not well known, for more than twenty years. For this reason, unrated bonds seldom have terms of more than 15 years and frequently have terms of ten years or less.

2.) **Rates.** We must always begin any discussion of the interest rates on tax-exempt municipal bonds by saying that they are generally low, and that they are always lower than commercial rates.

This is very important. When people get involved in a project and they start comparing tax-exempt bonds, they start talking about how much higher one is than the other. At this point, it is good for everyone to take a break and remember that all tax-exempt bonds have lower rates than their taxable counterparts.

Now, in the tax-exempt municipal bond markets as is the case with all of the major capital markets, rates are set by supply and demand as well as investor expectation of future interest rates. Up-to-the-minute rates are collected and published electronically as national municipal bond indices. These indices cite the rates for higher quality, or investment grade rated, bonds.

Since the indices reflect a mix of investment grades, bonds with the highest ratings (AAA) will enjoy rates slightly lower than the national index. On the other hand, bonds which do not have a rating at all, or whose rating is not investment grade, will carry rates considerably above the national index. Furthermore, the spread between AAA rated bonds and unrated bonds may vary greatly from state to state, and even in some instances within states. It should also be noted that the market for unrated bonds is very thin and, because of this, rate spreads are very volatile.

The graphic representation of the national indices at the various terms is called the yield curve. Interest rates are depicted along the vertical, or y-axis, and time is depicted along the horizontal, or x-axis.

As we discussed in Chapter 10, the yield curve has for almost all of the last decade trended from lower left to upper right. That means the lower the number of years, the lower the interest rate; and, conversely, the higher the number of years, the higher the interest rate. The reason for this is uncertainty. Investors want higher rates the longer they are willing to go out because of the greater uncertainty associated with longer terms.

So, this is the normal posture of the market. Rates rise over term. If you want a twenty-year term, you should expect a higher rate than for a ten-year term. In addition, from our previous discussion of term, you should also be aware that for terms over twenty years, the market thins out dramatically and as you go over thirty years rates begin to rise rather abruptly.

3.) Financing Costs. The financing costs of issuing bonds will amount to several percentage points of the project cost. They will include the fees of the Financial Advisor, the outside counsel, the underwriter's discount or bond placement agent's fee, the investment banker's counsel fee and the bond trustee's fee, as well as printing and miscellaneous costs. Depending on the nature of the bond, the financing costs might also include a rating agency fee and a bond insurance premium.

Table 11-A in Chapter 11 estimates the financing costs on a \$1,000,000 tax-exempt bond at \$56,500, or 5.65% of principal. These additional costs have the same effect on annual debt service payments as if the interest rate on the bonds had increased from 7.0% to 7.72%.

Financing costs will be higher for underwritings than for private placements. Such costs will also be higher for rated issues than for

unrated issues. And, insuring a bond issue will, by definition, increase upfront costs.

For example, a bond insurance premium on an A-rated bond issue might cost 0.95% of bond principal. This would translate into 0.12% of TIC on an annual basis. But the annual savings in interest rate generated by the insurance might be 0.25%. In such case, the water or wastewater system would have a net savings of 0.13% a year. Thus, financing costs alone should not dictate the use of one or another financing program. Rather, the net cost on a TIC basis must be determined and then compared against the other cost factors affecting all other financing programs.

4.) **Delay.** Delay is only a modest factor in bond financing. In order for a bond issue to obtain its tax-exempt status, several formalities must be observed under federal law and often under state law as well. These formalities, such as official notice and meeting requirements for system boards of directors or sometimes even public hearings, generally add from 60 to 120 days from the date on which the board decides to issue bonds until the bonds are actually issued.

5.) **Imposed Costs.** The issuance of tax-exempt bonds does not involve any imposed costs. Other than the additional financing costs involved in bond issuance (which, if we were really splitting hairs, could be considered a form of imposed cost), there are no other additional costs or charges as a result of issuing tax-exempt municipal bonds.

6.) **Eligibility.** When it comes to financing the capital improvements of water and wastewater systems, virtually 100% of the normal project costs will be eligible for funding with the proceeds of a tax-exempt municipal bond. This includes such "soft" costs as engineering studies, and the like.

There are a small number of items, such as labor training costs, which cannot be financed. But since they are not tangible assets with extended service lives, they are unsuitable for financing with any type of long-term debt.

7.) **Coverage.** The issuance of tax-exempt bonds does not, in and of itself, require that the revenues of a water or wastewater system be any higher than are necessary to make annual debt service payments. If the bonds are rated, however, by a national rating agency, that agency will, under current rating standards, require that the system's cash available for debt service exceed by 25% the system's annual debt service payments. In other words, they will require a debt service coverage ratio of 1.25 times.

In addition, on unrated issues the investment bankers themselves may impose coverage ratios. These coverages obviously create a cushion or margin of error against default. Investment bankers will require the additional coverage as a comfort to assure their investor clients that the possibility of default is truly minimal.

Chapter 18

Commercial Bank Loans

Commercial banks were once a major source of funding for public works projects of all kinds. However, since the advent of "money market" funds in the early 1970's, this is no longer true.

Before the 1970's, Americans had passbook savings accounts paying steady and seldom-changing rates of interest. Once people began making regular deposits, they seldom made withdrawals. The only reasons why a depositor would make a withdrawal would be either for an emergency or for a truly milestone event, such as the birth of a baby, the purchase of a new home or the tuition for a college education.

Once money market funds were created, however, people finally began to realize that their bi-weekly deposits were, in fact, investments.

Once they began to look upon their bank accounts and their money market accounts as real investments, the next major awakening was that people should compare these different types of investments to see which offered the best return.

It was no great surprise that the bi-weekly deposit in the local bank ran a poor second to the yields obtainable from the money market accounts. For several years thereafter, literally billions of dollars a week poured out of the banking system and into a growing multiplicity of new money market accounts. To ward off disaster and stanch the flow of withdrawals, the banks finally created and began offering their own money market accounts. In addition, the banks also began offering, for the first time, certificates of deposit in small denominations.

The principal casualty in this struggle for the American savings dollar was the old fashioned passbook savings account at the local bank.

The most significant aspect of this truly watershed event in the financial history of the United States was that, for the first time in history, local banks could not count on huge sums of money remaining static in passbook accounts for twenty, thirty or even forty years.

Once these long-term deposits disappeared, so too did the banks' ability to make long-term, fixed-rate loans. Without having long-term deposits, such as the passbook accounts, on which they paid a fixed-rate of interest and seldom suffered withdrawals, the banks were simply unable to deal with clients who needed long-term, fixed-rate loans.

This cataclysmic change in the American banking industry, the ramifications of which are still going on, sets the stage for the banking policy which water and wastewater systems face when looking for long-term loans to fund their capital improvement projects.

With this in mind, we will now examine the seven cost factors as they apply to commercial bank loans under the new constraints facing the banking industry.

1.) **Term.** The most radical difference wrought by the changes in the banking industry described above is that banks literally cannot offer long-term loans. For these reasons, the longest terms which banks will customarily offer in today's environment for loans to fund the capital improvement projects of water and wastewater systems are in the five-to ten-year range.

Only seldom will banks offer terms of up to fifteen years. And under such circumstances, such loans would never carry fixed rates. On the contrary, these loans will either have floating rates, or the rates will be adjustable annually or every few years, at the very most.

2.) **Rates.** As indicated above, the radical changes in the banking industry have put an end to fixed-rate loans. The reason for this is that money market and other such accounts pay a different rate of interest every day. If the banks are required to pay their depositors a different rate of interest every day on their money market accounts, then they certainly cannot risk fixing the rates which their borrowers pay to them.

In the past, fixed-rate loans were common. Today, they are so scarce as to be utterly non-existent. If willing to give a fixed-rate commitment, the rate is seldom fixed for more than a few years, at most, at which time the rate is reset according to the then current rate environment.

If state law permits a loan form which qualifies as a tax-exempt borrowing under the provisions of the United States Internal Revenue Code, then, depending on the degree to which the interest on the loan is exempt from federal and state income taxes, the bank will generally offer a rate which is substantially below the bank's normal lending rates.

If the tax-exempt loan is to be a floating rate loan, then it will be considerably below prime; and, it will generally be expressed as a percentage of prime. Rates between 60% and 90% of prime are common.

If the bank offers a fixed rate, then the determination of the interest rate will be more complicated. The exact rate offered will depend on three factors. The first factor is what rates the national indices are indicating for tax-exempt debt of similar maturity. The second factor is the bank's estimation of the credit worthiness of the borrowing water or wastewater system. The third factor is competition. If the bank knows that it is one of several quoting on a loan to a financially sound and well established system, then it will set a rate close to the national index rate. On the other hand, if the bank feels it has the field to itself, it may quote a scandalously high rate of interest for the same credit.

If the loan does not qualify for the federal income tax exemption, then a different interest rate regime can be expected.

If the bank offers a floating rate, it will be at prime or as much as 2.5% or 3% above prime. If the bank offers a fixed rate, then the rate will be determined according to the three factors cited above for determining the interest rate on a tax-exempt bond, with one exception.

The exception is that the various U.S. Treasury Bond rates will be used as a base rate instead of the national index for tax-exempt bonds. However, since the Treasury rates reflect the highest credit rating of all (the United States Government), and since the bond indices reflect only a blend of rates, the rate, which the bank will offer, will be significantly above the rate on the commensurate Treasury Bond.

3.) **Financing Costs.** The financing costs involved with commercial bank loans tend to be quite reasonable.

Borrowers are generally required to pay only for their own counsel as well as for the bank's counsel. This is, of course, in addition to paying for the system's Financial Advisor, who must be paid regardless of the financing program used.

Banks will also generally charge a commitment fee or points, which are paid upon commitment or at closing, respectively. They will also charge an annual servicing fee.

4.) **Delay.** Water and wastewater systems will face no delays in obtaining commercial bank loans.

5.) **Imposed Costs.** The imposed costs involved in commercial bank loans are quite modest. They involve such things as fees for additional land surveys or fees for appraisals, or confirming appraisals, of property which will be mortgaged as part of the financing program.

6.) **Eligibility.** When it comes to commercial bank loans for water and wastewater systems, the concept of ineligibility results from the banks' limits on the amount they will lend against certain classes of collateral. In other words, quantitative ineligibility. For example, a bank may simply not lend more than 50% of the cost of raw land or 80% of the cost of a new structure.

This can create serious problems for water and wastewater systems since the balance of the amount required is virtually unfinanceable. In almost all cases, the unfinanced amount must be paid in cash.

As such, if a system has no reserve funds, it must levy an assessment on the ratepayers. Such an assessment will invariably be expensive, highly unpopular, and may cause delays which will add even further to total project cost.

7.) **Coverage.** Banks will generally require a certain amount of excess coverage. For older water and wastewater systems with outstanding financial histories and ample reserve funds, a bank may not insist on excess coverage. But for the average system, which has tried to set its rates at just about the income level it needs to pay its bills, banks will not be comfortable without at least some excess income.

The coverage ratios required, however, in most instances, are fairly reasonable. Required ratios of 1.1x, 1.15x and 1.2x are common. Ratios in excess of 1.2x are very uncommon.

As you can see, bank loans are quite straightforward and free of red tape. Their drawbacks are that they may not cover total project costs and they may be at higher, taxable rates.



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Chapter 19

The Water and Waste Disposal Program of the Farmers Home Administration of the U.S. Department of Agriculture

The Water and Waste Disposal Program (WWDP) of the Farmers Home Administration (FmHA) of the U.S. Department of Agriculture (USDA) is one of the oldest and most successful financing programs in the country. Founded under the Consolidated Farm and Rural Development Act in 1940, the WWDP was part of the New Deal's effort to alleviate some of the financial burdens of rural America.

For the purposes of the WWDP, an area is currently defined as rural if it has fewer than 10,000 inhabitants, according to the last census. Eligible applicants for financial assistance through the WWDP are municipalities, special purpose authorities or districts and not-for-profit associations (cooperatives), which issue taxable or tax-exempt municipal bonds which are purchased by FmHA.

The WWDP is funded each year by appropriation. At the beginning of the 1980's, the appropriation for the WWDP was \$1 billion. During the eighties, the appropriation dropped to \$350 million. By the early nineties, it had bounced back to the \$600 million level.

Since it began in 1940, FmHA has approved over 30,000 loans totalling over \$10 billion.

The WWDP is actually both a grant and loan program. In the early 1990's, approximately \$200 million of grant funds are being appropriated for the program in addition to the loan funds. Grant funds are used to meet the needs of communities which cannot afford badly needed water or wastewater projects.

For example, let us say that a state health department orders a sewer district to build a new \$3 million treatment plant, which would require

annual debt service payments of about \$300,000 a year. FmHA determines, based on formulae which take into account population, income level and the sewer rates in adjacent districts, that the ratepayers in the sewer district can only afford to pay \$200,000 a year. In such case, FmHA would probably fund the project with a \$2 million loan, which would carry an annual debt service payment of about \$200,000, and a \$1 million grant. Since the grant would require no annual debt service payments, all the system would have to pay would be the \$200,000 a year on the FmHA loan.

As indicated above, FmHA's financial criteria for eligibility are based on two major factors. The first is affordability, which is reckoned on the percentage of median household income which constitutes the annual water or sewer charge. The second is how the water or sewer charges will compare to the water or sewer charges in adjacent districts after the rates are increased to pay for the new project.

Obtaining an FmHA loan is not easy. The entire process is quite rigorous. First, a system files a preapplication with the district office of the FmHA. The preapplication includes a thorough project description and financial statements for the last three years. Once the preapplication is filed it is then subject to intergovernmental review within the state. Here local and regional planning bodies are invited to comment on the project. The project must also be vetted by the state historic preservation officer. In addition to other certifications and acknowledgements, the applicant is required to furnish a certificate from an "authorized individual" that private sector financing is unavailable for the project. This is because, under federal law, the FmHA is supposed to be the lender of last resort. The FmHA is not supposed to compete with banks and investment banks. The "authorized individual" can be a sympathetic banker, investment banker, or even, in most cases, the system's own Financial Advisor.

Next, FmHA district office personnel visit and inspect the system and forward their comments and recommendations to the state office. Once a preapplication has been approved by the state office, the applicant is then invited to submit a formal application. FmHA solicits the formal application only when it has funds available for the project.

When the applicant submits its formal application, FmHA will also want to see updated financials as well as copies of the water or sewer rate ordinances establishing service charges at levels sufficient to meet debt service. FmHA will also require any Water Use Agreements, Connection Ordinances, Service Agreements, or Water Purchase Agreements. In addition, a variety of compliance (Civil Rights, etc.)

documentation is required as are all of the official resolutions and ordinances normally attendant to any municipal bond issuance.

Once FmHA has approved all of the above, the system is notified and the USDA's regional attorney begins working with the system's bond counsel to effect a closing.

As indicated above, each FmHA loan is a free standing municipal bond, similar in all other respects to the municipal bonds issued by any other water or wastewater authority or district.

Finally, it is worthy of note that FmHA usually requires quarterly payments on its bonds, and that the actual servicing of the loan is done by the FmHA district office.

Now, let us look at the seven factors which inflate total project cost and see what bearing they have on the WWDP.

1.) **Term.** The FmHA Water and Waste Disposal Program offers the longest term of any financing program available in the country.

Terms of up to forty years are available. FmHA may insist upon shorter terms if the service life of the assets being financed are significantly shorter than forty years. But in the main, FmHA will allow forty year terms for most major projects.

2.) **Rates.** FmHA lends money to water and wastewater systems at three different rates. They are called the Market Rate, the Poverty Rate and the Intermediate Rate.

The Market Rate is determined quarterly with reference to one of the major national indices of rates for tax-exempt bonds. On a daily basis The Bond Buyer, which is the bible of the entire public finance industry, publishes what is known as the "Twenty Bond Index." This is a composite of the rates of interest at which twenty, large, selected, investment grade-rated bonds traded on the preceding business day. The FmHA Market Rate is based on the midrange of the "Twenty Bond Index" for the preceding quarter.

The Market Rate is offered to eligible systems where the median household income of residents within the system's service area is above the state median household income level.

The Poverty Rate is 5%. It is available to eligible systems where the median household income of the residents of the district is below 85% of the state median income level.

The Intermediate Rate is available to eligible systems where the median household income is between 85% and 100% of the state median household income level. The Intermediate Rate is the arithmetic average of the Market Rate and the Poverty Rate.

3.) **Financing Cost.** The financing costs associated with the WWDP are limited to bond counsel fees. The FmHA requires what is known as a "red book" bond counsel. A "red book" bond counsel just means a "nationally recognized" bond counsel. Nationally recognized bond counsel are listed in The Bond Buyer's Guide to Municipal Finance. The cover of this book has been, traditionally, bright red. Hence, "red book" bond counsel.

The point here is that the red book bond counsel tend to be larger firms in larger cities; and they tend to be expensive. The reasons for this as well as an explanation of the role of the bond counsel is set forth in Chapter 11.

A word about the use of Financial Advisors is in order. FmHA does not require that systems use Financial Advisors to assist them. However, since the WWDP is only one of several financing options open to water and wastewater systems, it is still advisable for systems to retain FA's. Even once the financing options have been narrowed down to the WWDP, a Financial Advisor will generally prove to be well worth the cost.

4.) **Delay.** Getting an FmHA loan can take up to three years. The reasons for this delay are not all straightforward.

There is one cause of delay which is straightforward. That is the time it takes to do the Environmental Impact Statement (EIS). The time it takes to do the EIS is directly related to the environmental complexity of the project. If, for example, your system is just replacing a forty year old standpipe, then the environmental impact should be nil, and the EIS should be able to be prepared with alacrity. If, on the other hand, your system wants to lay a couple thousand yards of sewer main through a game preserve located on an ecologically sensitive wetland.....well, I certainly would not hold my breath waiting for that EIS.

The other cause of delay is harder to describe. And it certainly does not show up in the program literature or the regulations. It is not caused by bureaucracy. Although the USDA is a mammoth organization, there

is little bureaucratic delay involved in the FmHA program. Nor is there anything sinister about such delays.

The delays seem to emanate from the state FmHA staff's attempts to match the funds available with the preapplications in various stages of completion. Need is a factor. How long the preapplication has been pending is a factor. The cost of the project in terms of the number of people to be served may also be a factor. Finally, the sheer size of the project in terms of the funds allocated to the state for that year is also a factor.

The point is that projects may face considerable delay in obtaining funding for a variety of reasons beyond the control of the water or wastewater system's management. Since that is the case, system managements are well advised to sit down with their FA and the FmHA state and district staff to work out a realistic assessment of when a particular project is likely to be funded.

5.) Imposed Costs. FmHA does require "red book" bond counsel, as described above, which is expensive. The EIS may also be expensive, as described above, depending on how much the project impinges on environmentally sensitive areas.

But other than these two requirements, the WWDP does not impose any other costs on applicant water and wastewater systems.

6.) Eligibility. Happily, all standard project costs are eligible for funding under the WWDP. As previously noted, the WWDP loan, in most cases, takes the form of a tax-exempt municipal bond. In such case, you may wish to consult the discussion of Eligibility in Chapter 17, which covers municipal bonds.

7.) Coverage. For the first borrowing which a water or wastewater system makes through the WWDP, The FmHA does not require rates to be set any higher than is necessary to generate cash available for debt service equal to the system's annual debt service payments. FmHA does, however, require the funding of a modest debt service reserve over a ten year period. This means that cash available for debt service must be sufficient to include the annual contribution to this fund, as well as the annual debt service payment on the loan.

On subsequent borrowings which share the same system collateral with the WWDP loan, however, the FmHA requires a 1.2x debt service coverage ratio. This means that systems will have to set rates so that the cash available for the annual debt service payments on both loans exceeds the annual debt service payments on both loans by 20%.

This requirement, as previously stated, applies only to those subsequent loans which are on a parity with the collateral of the original FmHA loan. For subsequent loans whose collateral is subordinate to that of the original WWDP loan, the FmHA does not require this additional coverage.

* * * * *

In all, as you can see from the above, apart from the problem of possible extensive delays in funding, the WWDP is an extremely attractive program. Eligible systems, with populations of fewer than 10,000, are well advised to thoroughly review this financing option.

Chapter 20

The State Revolving Fund Program of the U.S. Environmental Protection Agency

The State Revolving Fund (SRF) Program is one of the newer funding programs available. Unfortunately, it is only available for wastewater projects. In addition, it is not available for privately owned wastewater systems. Only communities and public wastewater districts may apply.

The Clean Water Act of 1987 essentially replaced the old and widely known Title II grant program with a new revolving loan program established under Title VI.

Under the old Title II program, literally billions of dollars of outright federal grants had been made available to communities and wastewater systems for the construction or improvement of their water treatment facilities. Under the 1987 Act, some \$18 billion was authorized for the grant program as well as for the new SRF Program for the years 1988-1994. Most of these funds, however, will not result in subsequent grants to local communities or wastewater systems. Rather the funds will be made available through the SRF Program in the form of loans.

Under the SRF Program, the U.S. Environmental Protection Agency makes grants to the states based on the population of the state. Under the terms of the grants, the states are constrained to organize loan programs to make the funds available to local communities and public wastewater districts. In addition, for every five dollars of federal grant funds, the states are required to contribute an additional one dollar. So, a federal grant of \$25 million to a state will result in that state's having to contribute an additional \$5 million, for a total SRF lending capacity of \$30 million.

These funds are then loaned to communities and wastewater districts within the states for certain capital improvement projects. The beauty of this program is that when the loans are repaid by the communities and wastewater districts to the SRF, the SRF does not, in turn, repay the principal to the federal government. In short, the funds always remain within the state and available for further wastewater treatment projects.

The concept behind the SRF is twofold. First, from a public policy perspective, giving a community a loan, which must be repaid, as opposed to a grant, which does not have to be repaid, serves notice on the residents of that community that there is an actual dollar cost associated with every gallon of wastewater they produce.

Second, from a purely economic point of view, as a loan made to Community A is repaid, those funds become available for a subsequent loan to Community B. Assuming the states charge at least some rate of interest on their SRF loans, and that defaults and delinquencies are either minimal or nil, the pool of money in the individual SRFs will continue to grow steadily over the years. Hence, the fact that these federal grants to the states can be perpetually re-loaned is why the program is called a "revolving" loan fund.

Depending on the particular policies of the individual states, the actual funding mechanism may either be a loan made to a community or wastewater system or a tax-exempt municipal bond issued by that community or system.

It is important to note that although most of the rules and regulations which cover the SRF program are federal, the administration of the program is done on a state by state basis. It is, therefore, most important that wastewater systems which are contemplating projects contact the state agency responsible for the program as early as possible in the planning process.

1.) **Term.** The maximum term of SRF loans may not exceed twenty years. Terms may be shorter if the service life of the assets being financed are significantly less than twenty years.

2.) **Rates.** The interest rates on individual loans are entirely within the discretion of the states. They may be as low as 0% or as high as the market rates for tax-exempt bonds. (They may actually be higher, but to date no state has attempted this.)

Please also note that even if the state sets the interest rate at 0%, the annual debt service payment on a twenty year loan will be 1/20th of the principal amount, or 5% of the amount borrowed.

3.) **Financing Cost.** The financing costs of the SRF depend on whether the individual states require local systems to issue their own tax-exempt municipal bonds.

If not, financing costs can be limited to the Financial Advisor's fees and the outside counsel's fees for reviewing the state's loan documentation.

If the local system must issue bonds, but the SRF is the purchaser of the bonds, then financing costs will be limited to the fees of the Financial Advisor, the outside counsel and the bond counsel.

If, on the other hand, the state program provides a subsidy for a tax-exempt bond issued by a local wastewater authority, and the bond is sold on the open market, then substantial financing costs may be involved. In addition to the fees of the Financial Advisor, the outside counsel, and the bond counsel, there will be underwriter's discounts or bond placement agent's fees, and investment banker's counsel fees as well as printing and miscellaneous costs. Furthermore, there may even be rating agency fees and bond insurance premiums. Bond insurance premiums alone may add from 1% to 6% to the cost of the project.

4.) **Delay.** Although the SRF program has supplanted the old grant program under Title II, in enacting the new SRF program under Title VI, the Congress incorporated many of the Title II requirements for eligibility. To comply with these standards, an extraordinarily long planning and design procedure is required. This adds at least one year to the period before which funding through the SRF can be obtained. In addition, until 1995, the federal grants which initially fund the SRF are subject to annual appropriation by Congress. And, since the states generally use priority lists to allocate their limited funds, there may be considerable additional delays before funding. Furthermore, to the extent that a local system's need for building its new project is at variance with the priorities of the state agency which administers the SRF, a local wastewater system may face several years of delay.

5.) **Imposed Costs.** In addition to the costs occasioned by the delays caused by the Title II requirements, these mandates, in and of themselves, add substantial cost to the program.

For example, one major element of additional cost is the imposition of the so-called Davis-Bacon Act requirements. The Davis-Bacon Act is a federal law which requires that union scale wages be paid to craftsmen working on the project. The problem here is that, outside of major urban centers, there may be no local union scale for craftsmen's wages. This fact does not relieve the wastewater system from the onus of the law. Rather, the law may require that the union scale craftsmen's wages in a major metropolitan center hundreds of miles away be used as the wage scale on the project. This requirement alone can add literally hundreds of thousands of dollars to the cost of a large project.

Furthermore, there are seventeen such Title II requirements which apply to the SRF. Experts within EPA, who are familiar with both Title II and the SRF have estimated that these seventeen requirements add between 5% and 20% to the total cost of the project.

6.) **Eligibility.** In addition to the increases in project cost occasioned by the Title II requirements, there are some costs which are simply not able to be financed, at all, under the SRF program because they are ineligible. The most obvious and significant of these ineligible costs are land for plant sites as well as the easements and rights-of-way for collector systems. As discussed in Chapter 14, these costs, which are ineligible under the SRF program, can prove to be devilishly difficult to finance by other means. The ineligibility of such costs under the SRF program may well mean that systems electing to finance projects under this program may have to fund these costs through short-term commercial bank loans at taxable rates.

It is worthy of note that, if only 10% of the cost of a particular project were not eligible for funding under the SRF program, and if the the ineligible 10% had to be financed over a five year term with a commercial bank loan at taxable rates, the payments on the ineligible 10% alone would equal nearly one-third of total annual debt service payments on the project!

The alternative is even worse: no financing at all. In such case, the wastewater system undertaking the project would have to levy a large, highly unpopular, one-time assessment on the system's ratepayers.

7.) **Coverage.** If the state administrative agency opts to organize the SRF as a subsidy program involving the issuance of tax-exempt municipal bonds by individual wastewater systems, and if the state does not purchase these bonds directly, then either the investment banker who underwrites or places the bonds or a bond rating agency may impose excess coverage ratios as a condition of bond issuance, as well. These matters have nothing directly to do with the rules and regulations of the SRF program itself. Rather, they are simply an exigency of the issuance of any tax-exempt municipal bond. As such, you may well want to consult the appropriate sections of Chapters 15 and 17, which discuss Coverage and Municipal Bonds, respectively.

* * * * *

As you can see from the above illustrations of the seven factors which serve to inflate the costs of wastewater projects, the SRF program has numerous difficulties which can add considerable amounts of money to standard project costs. Nonetheless, it must be noted that the predecessor program of the SRF, the old Title II grant program, was one of the most widely used means of funding wastewater projects across the country.

The SRF program is intended to supplant the old grant program. As previously mentioned, its principal purpose is to begin instilling in the American public the true cost of disposing of every gallon of wastewater. The old grants came out of everyone's federal tax dollars. As far as the ratepayers of a system which received a grant were concerned, it was painless. It was so, because all of their fellow taxpayers in the country were footing the bill along with the individual ratepayers. But these days are now gone. Now, the SRF program requires ratepayers to recognize and pay for the costs of collecting and treating the wastewater they produce. As such it a valuable program; and it is one which every wastewater system should examine as a funding alternative for needed capital improvement projects.

The SRF program does have its difficulties; but the EPA staff and the states are working to get the Congress to ameliorate these problems. As such, each wastewater system contemplating a major project would be well advised to retain a Financial Advisor who is familiar with the SRF program, and to investigate thoroughly whether this financial program is suitable to fund, on a cost effective basis, the project at hand.

Appendix A

The following are the steps involved in calculating the Annual Debt Service Payment for a Level Payment Loan with the terms and conditions described below:

Principal Amount - \$100,000

Interest Rate - 10%

Term - 5 Years

- 1.) Take the interest rate (10%) expressed as a decimal (.1) and add it to the number 1, as follows: $.1 + 1 = 1.1$.
- 2.) Take 1.1 and divide it into the number 1, as follows: $1 / 1.1 = .9091$.
- 3.) Take .9091 and multiply it by itself as many times as there are years in the loan term (5). In other words, multiply .9091 by itself five times, as follows: $.9091 \times .9091 \times .9091 \times .9091 \times .9091 = .6209$.
- 4.) Subtract this number (.6209) from the number 1, as follows: $1 - .6209 = .3791$.
- 5.) Take this number (.3791) and divide it into the interest rate expressed as a decimal (.1), as follows: $.1 / .3791 = .2638$.
- 6.) Finally, take this number (.2638) and multiply it by the Principal of the loan (\$100,000), as follows: $100,000 \times .2638 = 26,380$. This number, in dollars (\$26,380), is the Annual Payment.

At this point, you should be very proud of yourself because you have just successfully used the following formula:

$$AP = P \times \frac{i}{1 - \left[\frac{1}{1+i} \right]^n}$$

Appendix B

The following are the steps for calculating the Annual Debt Service Payment on a Hewlett-Packard 12C calculator for a Level Payment Loan with the terms and conditions described below:

Principal Amount - \$100,000

Interest Rate - 10%

Term - 5 Years

- 1.) Key in the Principal Amount, as follows: 100000.
- 2.) Press the "Change Sign" key (CHS).
- 3.) Press the "Present Value" key (PV).
- 4.) Key in the number of periods, as follows: 5.

(N.B. Please recall that throughout this book we are assuming loans with annual principal payments. Thus the number of periods is equal to the number of years in the term.)

- 5.) Press the "Number of Periods" key (N).
- 6.) Key in the Interest Rate, in a non-decimal format, for the number of periods.

(N.B. A non-decimal format means that 10% is written 10, and not .1. In addition, the "interest rate for the number of periods" means that, assuming the interest rate is an annual interest rate (which it always is), then you must divide the interest rate by the number of periods in a year.

For example, if you are calculating the annual debt service payment on a loan with a 10% rate, but monthly payments, then you would divide the rate (10) by the number of periods in a year (12), or $10/12$, which equals .83.)

- 7.) Press the "Interest Rate" key (i).
- 8.) Press the "Payment" key (PMT), and the calculator will calculate and display the Annual Debt Service Payment which is \$26,380.

Appendix C

Annual Debt Service Payments on a \$1000 Level Payment Loan at Various Rates and Terms

<u>Rate</u>	<u>Term</u>								Years
	5	10	15	20	25	30	35	40	
5.00%	231	130	96	80	71	65	61	58	
5.25	233	131	98	82	73	67	63	60	
5.50	234	133	100	84	75	69	65	62	
5.75	236	134	101	85	76	71	67	64	
6.00	237	136	103	87	78	73	69	66	
6.25	239	137	105	89	80	75	71	69	
6.50	241	139	106	91	82	77	73	71	
6.75	242	141	108	93	84	79	75	73	
7.00	244	142	110	94	86	81	77	75	
7.25	246	144	112	96	88	83	79	77	
7.50	247	146	113	98	90	85	81	79	
7.75	249	147	115	100	92	87	84	82	
8.00	250	149	117	102	94	89	86	84	
8.25	252	151	119	104	96	91	88	86	
8.50	254	152	120	106	98	93	90	88	
8.75	255	154	122	108	100	95	92	91	
9.00	257	156	124	110	102	97	95	93	
9.25	259	158	126	112	104	100	97	95	
9.50	260	159	128	113	106	102	99	98	
9.75	262	161	130	115	108	104	101	100	
10.00%	264	163	131	117	110	106	104	102	



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Appendix D

Table D-1 Table of Increases in True Interest Cost (TIC)

Rate - 5%									
<u>Rate</u>	<u>Term</u>								Years
	5	10	15	20	25	30	35	40	
1	.36	.21	.15	.12	.10	.09	.08	.07	
2	.72	.41	.29	.23	.20	.17	.16	.15	
3	1.08	.61	.44	.35	.30	.26	.24	.22	
4	1.44	.82	.59	.47	.40	.35	.31	.29	
5	1.79	1.02	.73	.58	.49	.43	.39	.36	
6	2.14	1.22	.87	.70	.59	.52	.47	.43	
7	2.50	1.42	1.02	.81	.69	.60	.55	.50	
8	2.85	1.62	1.16	.93	.78	.69	.62	.58	
9	3.20	1.81	1.30	1.04	.88	.77	.70	.65	
10	3.55	2.01	1.44	1.15	.98	.86	.78	.72	

Table D-2 Table of Increases in True Interest Cost (TIC)

Rate - 6%									
Rate	Term								Years
	5	10	15	20	25	30	35	40	
1	.37	.21	.15	.12	.11	.09	.09	.08	
2	.73	.42	.30	.25	.21	.19	.17	.16	
3	1.10	.63	.46	.37	.31	.28	.25	.24	
4	1.46	.84	.61	.49	.42	.37	.34	.32	
5	1.82	1.04	.76	.61	.52	.46	.42	.39	
6	2.18	1.25	.91	.73	.62	.55	.51	.47	
7	2.54	1.45	1.05	.85	.73	.65	.59	.55	
8	2.89	1.66	1.20	.97	.83	.74	.67	.63	
9	3.25	1.86	1.35	1.09	.93	.83	.76	.70	
10	3.60	2.06	1.50	1.21	1.03	.92	.84	.78	

Table D-3 Table of Increases in True Interest Cost (TIC)

Rate - 7%									
Rate	Term								Years
	5	10	15	20	25	30	35	40	
1	.37	.22	.16	.13	.11	.10	.09	.09	
2	.74	.43	.32	.26	.22	.20	.18	.17	
3	1.11	.64	.47	.38	.33	.30	.27	.26	
4	1.48	.86	.63	.51	.44	.40	.36	.34	
5	1.85	1.07	.78	.64	.55	.49	.45	.43	
6	2.21	1.28	.94	.76	.66	.59	.54	.51	
7	2.58	1.49	1.09	.89	.77	.69	.63	.60	
8	2.94	1.70	1.24	1.01	.89	.79	.72	.68	
9	3.30	1.91	1.40	1.14	.98	.88	.81	.77	
10	3.66	2.12	1.55	1.26	1.09	.98	.90	.85	

Table D-4 Table of Increases in True Interest Cost (TIC)

Rate - 8%								
Rate	Term							
	5	10	15	20	25	30	35	40 Years
1	.38	.22	.16	.13	.12	.11	.10	.09
2	.76	.44	.33	.27	.23	.21	.20	.19
3	1.13	.66	.49	.40	.35	.32	.29	.28
4	1.51	.88	.65	.53	.46	.42	.39	.37
5	1.88	1.10	.81	.67	.58	.53	.49	.46
6	2.25	1.31	.97	.80	.69	.63	.59	.56
7	2.62	1.53	1.13	.93	.81	.73	.68	.65
8	2.99	1.74	1.29	1.06	.92	.84	.78	.74
9	3.36	1.96	1.45	1.19	1.04	.94	.88	.83
10	3.72	2.17	1.60	1.32	1.15	1.04	.97	.92

Table D-5 Table of Increases in True Interest Cost (TIC)

Rate - 9%									
Rate	Term								Years
	5	10	15	20	25	30	35	40	
1	.38	.23	.17	.14	.12	.11	.11	.10	
2	.77	.45	.34	.28	.25	.22	.21	.20	
3	1.15	.68	.50	.42	.37	.34	.32	.30	
4	1.53	.90	.67	.56	.49	.45	.42	.40	
5	1.91	1.12	.84	.69	.61	.56	.53	.50	
6	2.29	1.35	1.00	.84	.69	.67	.63	.60	
7	2.66	1.57	1.17	.97	.85	.78	.73	.70	
8	3.04	1.79	1.33	1.11	.97	.89	.84	.80	
9	3.41	2.01	1.50	1.24	1.09	1.00	.94	.90	
10	3.78	2.22	1.66	1.38	1.21	1.11	1.04	1.00	

Table D-6 Table of Increases in True Interest Cost (TIC)

Rate - 10%								
Rate	Term							
	5	10	15	20	25	30	35	40 Years
1	.39	.23	.17	.15	.13	.12	.11	.11
2	.78	.46	.35	.29	.26	.24	.23	.22
3	1.17	.69	.52	.44	.39	.36	.34	.33
4	1.55	.92	.70	.58	.52	.48	.45	.43
5	1.94	1.15	.87	.73	.65	.60	.56	.54
6	2.32	1.38	1.04	.87	.77	.71	.68	.65
7	2.70	1.61	1.21	1.01	.90	.83	.79	.76
8	3.08	1.83	1.38	1.16	1.03	.95	.90	.87
9	3.46	2.06	1.55	1.30	1.15	1.07	1.01	.97
10	3.84	2.28	1.72	1.44	1.28	1.18	1.12	1.08

Appendix E

The following are the steps necessary to calculate the increase in True Interest Cost (TIC) on a Hewlett-Packard 12-C calculator for the example below:

Project Cost - \$100,000

Additions to Project Cost - \$8,000

Interest Rate - 10%

Term - 5 Years

- 1.) Key in the Project Cost, as follows: 100000.
- 2.) Press the "Enter" key.
- 3.) Key in the Additions to Project Cost, as follows: 8000.
- 4.) Press the "Addition" key (+). At this point, the display should read 108,000.
- 5.) Press the "Change Sign" key (CHS).
- 6.) Press the "Present Value" key (PV).
- 7.) Key in the number of periods, as follows: 5. (For explanation of "periods" see Appendix B.)
- 8.) Press the "Number of Periods" key (N).

- 9.) Key in the Interest Rate, in a non-decimal format, for the number of periods, as follows: 10. (For an explanation of this procedure, please see Appendix B.)
- 10.) Press the "Interest Rate" key (i).
- 11.) Press the "Payment" key (PMT).
- 12.) Key in the Project Cost, again, as follows: 100000.
- 13.) Press the "Change Sign" key (CHS).
- 14.) Press the "Present Value" key (PV).
- 15.) Press the "Interest Rate" key (i).
- 16.) Key in the Interest Rate, again, in a non-decimal format, as follows: 10.
- 17.) Press the "Subtraction" key (-). At this point, the calculator will be displaying "3.08," which is the increase in the True Interest Cost caused by the Additions to Project Cost. In other words, the true cost of borrowing is 13.08%, not 10%.

Appendix F

Principal Component of Annual Debt Service Payment for \$1,000 Level Payment Loans

<u>Rate</u>	<u>Term</u>								Years
	5	10	15	20	25	30	35	40	
5%	\$181	80	46	30	21	15	11	8	
6	177	76	43	27	18	13	9	6	
7	174	72	40	24	16	11	7	5	
8	170	69	37	22	14	9	6	4	
9	167	66	34	20	12	7	5	3	
10%	\$164	63	31	17	10	6	4	2	



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