A
Practitioner's
Guide

STRUCTURING AND SIZING THE BOND ISSUE
HOW TO DEVELOP AN OPTIMAL
FINANCING APPROACH

To
Effective
Debt
Management

GOVERNMENT FINANCE OFFICERS ASSOCIATION
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STRUCTURING AND SIZING THE BOND ISSUE:
How to Design an Optimal Financing Approach

INTRODUCTION

An integral part of preparing for the sale of bonds is determining the size of the issue and how the offering will be structured. Structuring and sizing decisions have important long-term consequences, affecting the amount of debt service paid over the life of the bonds, the extent of the added financial burden of the new debt, and the jurisdiction’s flexibility in responding to lower interest rates or other changes in its environment. The process of structuring and sizing the bond issue must be undertaken carefully so whatever options are chosen support the issuer’s long-term financial and policy objectives.

Issuers have a number of options regarding the structure of the issue. Security provisions of the offering, the maturity of the debt, how debt service will be paid, redemption provisions, and specific marketing features to attract investor interest in the issue are integral structural features of any bond offering. The issuer may face particular financing constraints requiring that debt service for the issue not begin before a certain date, or that debt service payments on the total outstanding debt portfolio conform to a specific schedule. A bond offering can be tailored to meet these issuer objectives.

In sizing the offering, the issuer will identify all costs to be paid from bond proceeds, which in turn determines how much debt should be issued. Capital project construction or acquisition costs are the primary use of bond proceeds. However, there are other expenses associated with a financing that the issuer may want to pay from bond proceeds. Up-front issuance costs (underwriter’s compensation, fees to bond counsel, etc.), any bond insurance premium, interest during the construction period, and moneys used to fund a debt service reserve are among the items commonly paid from bond proceeds. Issuers required to obtain voter approval for a bond issue will need to estimate these costs before the election so the bond referendum reflects the necessary amount of bond proceeds.

Certain structural features of the issue will have an impact on the amount of bond proceeds available for capital projects, and must be considered when sizing the issue. Because the sizing and structuring of the bond issue are closely interrelated, both parts of the process need to be considered in tandem. As
various techniques are considered, issuers will need to resize the offering to ensure that sufficient proceeds are obtained to complete planned capital projects.

The options available for structuring and sizing an offering are closely related to the method of sale. In a negotiated sale, the issuer is able to benefit from the input of an underwriter who is closely attuned to municipal market conditions. The underwriter will be able to advise on whether particular structural features that might make sense from the issuer’s perspective will be attractive to investors. Issuers should clearly understand any proposed structural features, including their impact on the overall cost of borrowing, their effect on future debt issues, and any new administrative burdens placed on the issuer.

This publication will focus on structuring and sizing options for new money issues only, and will not address advance refundings. An advance refunding is a technique to refinance existing debt, and is undertaken to achieve specific issuer objectives. Most often, an advance refunding is undertaken to take advantage of lower interest rates. This technique can also be used to remove the effect of burdensome bond covenants. The financing objectives of a refunding and techniques to achieve them will be considered in a separate publication on this topic.

Prior to evaluating the size or structure of a bond issue, certain basic characteristics of the offering should already have been determined. Among these characteristics are the purpose of the issue, which can be significant in determining whether the securities are governmental purpose or private activity bonds, the type of securities that will be sold (short-term notes or long-term bonds), the repayment source, and whether the bonds will be taxable or tax-exempt.¹

An important step at this preliminary stage is to examine legal or statutory provisions governing the issuance of debt. The issuer’s debt policies should also be reviewed to be sure the proposed financing is consistent with these policies. Particular

¹ Structuring and sizing options that the issuer may want to consider will be affected by the tax status of the bonds. For example, certain provisions of the federal tax code will limit the available options for structuring or sizing tax-exempt issues, but are not applicable to taxable securities. This publication focuses on tax-exempt securities; issuers planning to sell taxable securities should consult with bond counsel and their financial advisor and/or underwriter to determine an optimal sizing and structuring approach for these bonds.
attention must be paid to any constraints that may limit sizing and structuring options. Such limitations might include the amount of outstanding debt that is legally permitted. They may also include requirements pertaining to the maturity of the debt; debt service repayment schedule; use of capitalized interest; or incorporation of an original issue discount or premium.

Existing bond covenant provisions may also constrain the issuer’s ability to undertake a planned financing if parity bonds are issued -- that is, bonds with the same priority of claim against pledged revenues. For example, the issuer may have an additional bonds test specifying that no new parity bonds may be issued unless net revenues provide a certain level of debt service coverage for outstanding and new debt (e.g., net revenues must provide 1.25 times debt service coverage). The issuer will need to devise a structure to ensure that bond covenants are not violated.

Finally, credit strengths and weaknesses should be assessed along with any goals the issuer has with respect to obtaining a rating upgrade or avoiding a downgrade. As will be discussed, various structuring options may affect the rating agencies’ perceptions of the credit quality of the issue. Factors such as the security pledge and how rapidly debt is retired are important considerations in the rating process. The issuer’s credit objectives should be well defined so that an appropriate structure can be designed.

Structuring and sizing the bond issue are complex tasks. Issuers must be sure they have a clear understanding of any options they are considering, and must have access to the resources and tools needed to efficiently evaluate alternatives. One such resource is access to a good financial advisor. Many of the structuring techniques discussed in this publication are only cost-effective under certain market conditions and can result in increased interest costs if the issuer does not fully understand when they are appropriate. Credit quality may also be jeopardized if structuring options are improperly used. Issuers with limited experience should obtain the assistance of a well-qualified financial advisor, particularly if any but the most basic sizing and structuring options are contemplated.

The mathematics involved in structuring and sizing an issue involve solving for several variables simultaneously. As noted earlier, issuers may use particular structuring techniques in order to obtain a specific amount of proceeds for construction projects. Adjustment of one or more of these structural
features may change the amount of proceeds available for the project. Sizing the issue is equally complex, especially if the issuer is dependent on investment earnings on funds such as construction, capitalized interest, or debt service reserve. Changes in the drawdown schedule or interest rate assumptions will also affect the sizing calculation.

A bond software package is essential to perform computations needed to compare options. These packages can help an issuer to develop an optimal bond size and structure, taking into account the costs that will be paid from bond proceeds, the expected interest earnings on various accounts funded with bond proceeds, the timing and amounts of revenues that will be used to repay the debt, and specific issuer goals.

Another prerequisite is ready access to certain market data, such as interest rates for bonds and investments. The issuer’s financial advisor or underwriter can provide this information. Bond interest rates by rating can also be found in *The Bond Buyer*. These data can be useful for planning purposes. *The Bond Buyer* also publishes other interest rates which may be helpful in projecting investment earnings. *The Wall Street Journal* is another readily available source for this information. Other information that is needed will be discussed in greater detail in later sections of this publication.

**STRUCTURING THE ISSUE**

Issuers must take into account a broad range of legal, policy, and financial objectives in the process of structuring a bond offering. Among the questions often raised in the context of structuring the issue are:

- What legal or statutory constraints must be taken into account in devising the bond structure?
- What financial or policy objectives must be met through the structuring and sizing process?
- Are there structuring criteria imposed by the rating agencies or credit enhancer?
- Are there particular structures that can result in lower overall financing costs? For example, can certain structural features produce savings because they are attractive to particular investor groups?
- How will the new debt be integrated into the outstanding debt portfolio?

Issuers have a number of structuring options to consider before selling the bonds. Structuring elements to be addressed in this publication are:
- Security provisions;
- Use of fixed and variable rate bonds;
- Debt service payments: maturity, timing, and use of capitalized interest;
- Serial and term bonds;
- Zero coupon/capital appreciation bonds;
- Premiums and discounts; and
- Redemption provisions.

**Security Provisions**

One of the most significant factors with regard to the structure is the security for the offering. The nature of the pledged revenues to repay the debt and restrictions on the use of these revenues have important ramifications for the amount of bonds that will need to be issued and the design of the debt service schedule, particularly in the case of revenue bonds. This section will focus on security provisions, including a discussion of types of security pledges, use of credit enhancement, and special security considerations for revenue bonds.

**Type of Security**

Long-term bonds generally fall into two categories: general obligation (G.O.) bonds and revenue bonds. General obligation bonds are backed by a pledge on the part of the issuer to raise sufficient taxes to repay the debt. While a G.O. pledge covers the full range of revenues available to state and local governments, specific revenue sources are likely to be relied upon more heavily depending on the type of jurisdiction. For local government, the property tax is usually the major source of security for the debt, whereas for states, income or sales taxes are predominant. The security pledge for "unlimited" tax G.O. bonds is straightforward: the issuer agrees to raise taxes without limitation as to rate or amount such that principal and interest are paid on time and in full. Some jurisdictions issue "limited" tax G.O. bonds, whereby taxes may be levied only up to a predetermined rate to make debt service payments.

Revenue bonds are secured by a specified stream of revenues, either generated from payments for services provided by the facility or system, or from another dedicated source (e.g., a sales tax). These bonds may be secured by either a gross or net revenue pledge. For a gross pledge, pledged revenues are used first to make debt service payments before paying operating and maintenance costs or other expenses. A net revenue pledge requires debt service to be paid after operating and maintenance costs are met.
Investors want assurance that pledged revenues will be sufficient for debt service payments. To the extent that pledged revenues expected to be applied to debt service payments are not sufficient, such as during the start-up period of a revenue-producing facility, the issuer may want to incorporate certain structural features -- for example, using capitalized interest, deferring principal payments, or including capital appreciation bonds -- to ensure that its debt obligations are met. (These options are discussed more fully in later sections of this publication.) If another source of revenue can be pledged to make interim debt service payments, the issuer will not be required to rely as heavily on alternative structuring techniques to meet debt service requirements before the facility becomes fully operational.

Issuers may choose to enhance the security of a particular bond offering by purchasing credit enhancement, usually in the form of either bond insurance or a letter of credit. Credit enhancement provides assurance to investors that debt service payments will be made in full and on time, even if the issuer is delinquent in making payments or defaults on the bonds. In exchange for this guarantee, issuers pay a premium to the credit enhancement provider.

The primary reasons issuers purchase credit enhancement are to save money on debt service costs and to enhance the marketability of an offering. The coupon interest rates for bonds secured by a guarantee from a highly rated third party will be lower than for bonds without such a guarantee for certain credit qualities. This is because investors are willing to accept lower returns in exchange for less risk. Growing demand for tax-exempt bonds on the part of retail investors, who tend to be more risk averse, has increased the demand for credit-enhanced bonds. Bonds featuring complex security provisions or an innovative financing product may have difficulty in the market without credit enhancement.

Revenue bonds have particular security concerns that must be addressed in the structuring process. In drafting the bond ordinance or trust indenture, specific obligations of the issuer with regard to the security of the bonds will be explicitly defined. Provisions governing the flow of funds securing the debt, bond covenants, and debt service reserve requirements

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2 A more complete discussion of factors that should be considered in purchasing credit enhancement is found in a separate publication in this series entitled, 
*Purchasing Credit Enhancement: How To Decide if Bond Insurance Makes Sense.*
are likely to be included in these documents. Issuers need to be sure they understand the requirements and long-term consequences of options being considered when designing these additional security features. Issuers should require their bond counsel or financial advisor to diagram intricate flow of funds proposals to be sure they work and are administratively acceptable.

1. **Flow of Funds.** The flow of funds refers to the order and timing in which pledged revenues may be used. The bond ordinance or trust indenture will define the order in which revenues flow to various funds, including operations and maintenance, debt service, debt service reserve, repair and replacement, depreciation, or other designated funds. Investors will be interested in the priority of debt service payments in relation to other obligations. The timing of revenue transfers to these various funds (monthly, quarterly, semi-annually, etc.) is another investor concern. More frequent deposits provide greater assurance that timely repayment of debt will occur. Finally, decisions must be made on how surplus revenues may be used. A requirement that surplus revenues be retained by the revenue-generating enterprise rather than used for any legally authorized purpose provides greater comfort to investors, since these moneys provide a cushion for adverse financial conditions.

2. **Bond Covenants.** Bond covenants are legal provisions that impose certain restrictions on the issuer for the benefit of investors. Bond covenants are key elements of the bond ordinance or trust indenture. Among the most common provisions are the following:

   a) A rate covenant that requires the issuer to maintain rates and charges to satisfy the revenue requirements of the service being provided.

   b) A debt service coverage covenant, measured as the ratio of pledged revenues available to pay debt service to the annual debt service requirement. Coverage requirements vary depending on the type of facility being financed. Often, these covenants specify that net revenues must provide in the range of 1.10 - 1.25 times debt service coverage.

   c) Requirements to operate and maintain the financed facility and to provide adequate casualty insurance.

   d) An additional bonds test that prohibits an issuer from issuing parity bonds unless certain coverage requirements with respect to outstanding and new
debt are met. Coverage may relate to historical or projected revenues, although a test based on historical receipts is preferred by the rating agencies. For example, an additional bonds test might stipulate that no new debt may be issued unless net revenues for the past 12 months provide coverage in excess of 1.25 times debt service in any future year for outstanding and proposed new debt.

e) A list of permitted investments for pledged funds, which has become increasingly important as a result of recent investment losses by major state and local investment pools.

3. **Debt Service Reserve.** Revenue bonds rely on a dedicated stream of revenues for debt repayment. Because of uncertainty associated with revenue receipts from fees and charges of a revenue-producing facility, bondholders may be concerned about the ability of the issuer to meet debt service payments in a timely manner. To increase the security and marketability of their bonds, issuers will often be required to create a debt service reserve. This fund may be tapped if pledged revenues are not sufficient to make debt service payments in a timely manner. The fund then must be replenished as revenues become available.

Bond proceeds are often used to fund a debt service reserve. The debt service reserve also may be funded with cash -- for example, from available or surplus revenues generated by the system. A cash-funded reserve has certain credit advantages that the issuer may want to consider. First, the size of the borrowing is reduced, resulting in a lower debt burden. Second, if the reserve is ever utilized to make a debt service payment, the issuer will not have expended bond proceeds that must then be recovered and repaid on some future date.

There are potential disadvantages in funding the debt service reserve with either bond proceeds or cash. If bond proceeds are used, the issuer must increase the size of the offering by the amount of the reserve, thereby depleting debt capacity that would otherwise be available for capital projects. This can be particularly problematic for issuers subject to statutory or constitutional debt limitations and who have substantial capital needs. Alternatively, some issuers find it difficult to tie up in a reserve fund large amounts of cash that might be needed for system operations or pay-as-you-go capital projects. Rather than fund the debt service reserve with bond proceeds or cash, the issuer may opt to
purchase a letter of credit or a surety bond. A surety bond is a financial instrument in which a third party guarantees that it will make the required debt service payments up to the amount covered by the surety bond if moneys must be drawn from the debt service reserve fund to make those payments.

One final point on creating a debt service reserve pertains to tax restrictions. Under federal tax law, the size of a debt service reserve does not have to be yield-restricted if it is sized to be the least of 125 percent of the average annual debt service, maximum annual debt service, or ten percent of the par (or face) amount of the bonds. Caution must be exercised in sizing the reserve, since exceeding the maximum allowable debt service reserve will require the issuer to limit earnings on the reserve to the yield of the bonds. Bond counsel should be consulted to ensure that this federal tax requirement is met.

**Fixed and Variable Rate Debt**

Bonds can be issued with either a fixed or variable rate structure. Fixed rate bonds pay investors a predetermined interest rate over the life of the bonds. Issuers of fixed rate bonds have the certainty of knowing what debt service payments will be over the life of the bonds and are not exposed to rising interest rates. However, they do not benefit if interest rates fall.

Issuers also may choose to issue variable rate debt. Like fixed rate debt, variable rate debt may not be retired for several years into the future; however, unlike fixed rate debt, interest rates are reset periodically -- for example, weekly, quarterly, semi-annually, or annually -- based on market conditions. Consequently, in a positively sloping yield curve environment, issuers of variable rate debt can expect to pay a lower rate of interest than they otherwise would pay on fixed rate bonds.

Most variable rate issues contain both a floating interest rate and a “put” or “demand” feature, allowing an investor to require the issuer to purchase his or her bonds in accordance with specified terms and receive the par amount of the bonds. On the dates on which interest rates are reset, investors decide whether to keep the bonds at the new interest rate or put them back to the issuer. Issuers need to be sure they have sufficient cash on hand to purchase these securities, and must then try to remarket the securities to other investors. For this reason, issuers typically obtain a liquidity instrument (e.g., a letter of credit) to guarantee that bonds can be purchased if put back by investors. They will also employ a remarketing agent to resell
the bonds to new investors. Both of these items add to the cost of issuing variable rate bonds.

Variable rate bonds have a number of advantages. While they are subject to interest rate fluctuations which may produce higher interest costs for short periods of time, these instruments will almost always result in a lower total cost of financing over the long run relative to fixed rate bonds. In addition, variable rate bonds provide flexibility in managing a debt portfolio. A variable rate offering includes a sinking schedule whereby the issuer promises to retire bonds at some predetermined rate. Since there are no yield curve advantages from the investor’s perspective as to when a bond is retired, the issuer can design a maturity schedule to meet particular debt management objectives. In addition, the demand or put feature of the securities provides an ongoing opportunity to manage the amount and maturity of outstanding debt. The issuer may decide not to remarket bonds that are put back by investors in order to accomplish debt management objectives.

There are potential risks and problems associated with variable rate instruments. First, interest rates could rise such that the variable rate paid in the future exceeds the fixed rate that could have been locked in when the bonds were issued. In many jurisdictions, interest rates on variable rate debt are capped at some maximum rate, limiting an issuer’s interest rate exposure to some extent.

Another potential concern for issuers that must maintain a debt service reserve fund is that they may be legally required to place sufficient proceeds in the fund to cover one year of debt service at this maximum rate. This requirement can result in the need to issue more bonds, and thus increase interest costs. The need to purchase a liquidity instrument also presents a risk for issuers of variable rate bonds. The term of a letter of credit is usually in the range of five to ten years, which may be less than the maturity of the debt; hence, issuers face the risk that the letter of credit may not be renewed.

A final disadvantage of variable rate bonds is the difficulty of budgeting debt service due to the uncertainty of interest rates. One problem is the need to accommodate interest rate changes during the fiscal year once the annual budget is adopted. Governments may also find it difficult to deal with year-to-year fluctuations in interest rates, particularly when rates are rising and the budget is tightly constrained.

Some issuers choose to keep a small portion of variable rate debt in their portfolio; typically, however, variable rate debt
does not exceed 10-15 percent of the total debt portfolio. One way to decide how much variable rate debt to issue is for the issuer to consider the amount of short-term investments it has. By issuing only as much variable rate debt as the amount of short-term investments, a hedge is created to mitigate the impact of interest rate fluctuations. If interest rates were to rise, increasing the issuer’s debt service liability, there would be a corresponding increase in investment earnings on the asset side of the balance sheet to offset the liability.

Variable rate debt entails a greater administrative burden than conventional fixed rate debt. Issuers planning to incorporate some variable rate debt in their portfolio must be able to meet the added administrative responsibilities arising from the ongoing remarketing of the bonds and changing debt service requirements.

In recent years, derivative products have gained greater acceptance by state and local governments either to synthetically create fixed or floating rate debt, or to limit exposure to interest rate swings when variable rate debt is used. With an interest rate swap, an issuer of fixed rate debt can exchange the payments it makes on its fixed rate debt for floating rate payments, or vice versa.\(^3\) Entering into a fixed-to-floating (or floating-to-fixed) interest rate swap agreement may be a more cost-effective option than directly issuing floating (or fixed) rate debt. Instruments such as caps, collars, and floors can be used in conjunction with variable rate debt to limit the issuer’s exposure to fluctuations in interest rates.\(^4\) All of these instruments carry inherent risks which should be clearly understood by issuers contemplating their use. They are clearly not appropriate for all issuers. For some issuers, however, derivative products can be beneficially employed in order to meet financial management objectives, and should thus be considered during the structuring process.

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\(^3\) A discussion of interest rate swaps is found in two articles in the October 1992 issue of the GFOA magazine Government Finance Review. See “An Issuer’s Perspective on Interest Rate Swaps,” by Philip N. Shapiro and T. Spencer Wright, and “Using Interest Rate Swaps as Part of an Overall Financing and Investment Strategy,” by John Haupert.

\(^4\) An interest rate cap is a financial instrument under which the purchaser receives a payment if an interest rate index exceeds a certain level. With an interest rate floor, payments are made if the interest rate index falls below a certain level. An interest rate collar is a combination of a cap and a floor. For a more extensive discussion of caps, collars, and floors, see “An Introduction to Municipal Derivative Products,” by Kathryn Engebretson and Gary Gray in the February 1993 issue of Government Finance Review.
Debt Service Payments

One of the most important aspects of structuring the issue relates to how rapidly debt is retired. This decision will determine the amount of the budget that must be devoted to debt service, how quickly debt capacity available for new projects is recovered, and the total interest cost of the borrowing. The debt service schedule also has implications for the credit quality of the issue that should be evaluated. This section will address considerations in designing the bond issue’s maturity schedule, determining when debt service payments begin, and deciding on the use of capitalized interest.

Maturity Schedule

In designing the maturity schedule of the bond issue, issuers need to consider how many years they want bonds to be outstanding. A number of factors will enter into this decision. Intergenerational equity considerations suggest that the maturity of the debt should correspond with the useful life of the project being financed. In this way, those who benefit from the project are also the ones paying for it. As a general rule, the maturity of the debt should not exceed the useful life of the project being financed.

Jurisdictions may, for policy or other reasons, decide to issue bonds with a final maturity that is less than the useful life of the project being financed. One reason for this decision could be a desire to reduce the total interest cost payable on the issue. The interest payable is a function of the average life of outstanding bonds, where average life is defined by the following formula:

\[
\text{Average Life} = \frac{\text{Total Bond Years}}{\text{Total Number of Bonds}}
\]

where:

\[
\text{Total Bond Years} = \text{Sum of (Amount of } \$1,000 \text{ Bonds per Maturity } \times \text{ Number of Years to Maturity)}
\]

\[
\text{Total Number of Bonds} = \text{Total Amount of } \$1,000 \text{ Bonds}
\]

The rating agencies look for evidence that a jurisdiction will be able repay outstanding debt in a timely manner, and the issue’s average life provides one measure of this ability. For example, Standard & Poor's has defined an “average” maturity schedule for general obligation bonds as one that retires 25 percent of
the debt within five years and 50 percent within 10 years.\(^5\) While the maturity of the debt is only one consideration of the rating agencies, issuers should be cognizant of the effect of the structure on the average life of the issue. It is important to balance rating concerns with the ability to manage a debt portfolio effectively.

Other factors may also encourage issuers to retire a bond issue more rapidly. For example, some jurisdictions issue bonds for capital purposes annually, and develop a retirement schedule such that the amount of bonds issued each year is equal to the amount retired in that year. The maturity of the debt may also be determined based on a financially prudent or politically acceptable level of debt service appropriation in the annual budget. Finally, some governments decide on an aggressive retirement schedule as a result of a stated policy objective.

The structure of debt service payments will reflect the pace at which the issuer wants to retire the bonds. There are three general approaches to structuring debt service payments:

- Level debt service;
- Level principal; or
- Ascending debt service payments.

Many variations to these approaches are also used to meet particular issuer goals. For example, some issuers choose a wraparound structure to level out debt service on the total outstanding debt portfolio, or tailor the debt service schedule to meet a particular revenue stream. Some of these options will be discussed later in this publication.

A level debt service structure is designed to create equal annual debt service payments over the life of the bonds. This approach results in higher interest payments and lower principal payments in the early years, similar to the amortization schedule used for many home mortgages. Over the life of the issue, the amount of principal repaid as a share of the total debt service gradually increases, until the debt is finally retired. The primary advantage of making debt service payments in this manner is that it is often easier for issuers to budget, and it may be consistent with the flow of pledged revenues used to retire the bonds. Another important advantage of a level debt service schedule is that it makes financing costs in the early years more affordable, particularly

in the case of a new project or service. Level debt service produces a slower repayment of principal than a level principal structure (described below), resulting in a longer average life for the issue.

With *level principal payments*, debt service is comprised of equal annual principal payments and declining interest payments over the life of the issue. Issuers pay higher total debt service costs in the early years relative to a level debt service structure, reflecting higher principal payments. As principal is retired, interest costs decline, thereby reducing the annual debt service payment over time. This approach results in a shorter average bond life, and provides comfort to the rating agencies and investors that the debt will be repaid in a timely manner. It also permits the issuer to recover debt capacity more rapidly. However, jurisdictions often find it difficult to make higher payments in the early years, since revenues used to repay the debt are likely to be lower in the early years and increase over time.

Exhibit 1 compares how a $20 million bond issue would be amortized over a 10-year period using a level debt service and a level principal payment approach. Note that annual debt service payments are higher in the early years using the level principal approach, but gradually decline so that by Year 6,

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<th>Coupon</th>
<th>Principal</th>
<th>Interest</th>
<th>Total</th>
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<td>2,475,000</td>
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<td>2,240,000</td>
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<tr>
<td>10</td>
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<td>121,000</td>
<td>2,121,000</td>
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</table>

<table>
<thead>
<tr>
<th></th>
<th>Level Debt Service</th>
<th></th>
<th>Level Principal Payments</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Total</td>
<td>$20,000,000</td>
<td>$6,980,834</td>
<td>$26,980,834</td>
<td>$20,000,000</td>
</tr>
</tbody>
</table>
annual debt service is lower relative to the level debt service approach. Moreover, the total interest cost associated with the level principal approach is lower relative to the level debt service approach.

Some issuers choose to make *ascending debt service payments*, where principal and/or interest are deferred in the early years. This method of payment can be appropriate for certain types of projects, such as a revenue-generating facility (e.g., one used in providing a water supply or wastewater treatment service) in a growing jurisdiction, where the revenues generated from user fees are expected to grow over time. The rating agencies will look carefully at issues using this approach, since it could provide evidence of difficulty in repaying debt in a timely manner.

As noted earlier, one way to approach developing a maturity schedule is to match the useful life of the projects being financed with the term of the debt. Many issuers finance a large number of capital projects with a single bond issue; hence, they are confronted with the task of designing a maturity schedule for an issue that will be used to finance many projects with varying useful lives.

The State of Wisconsin has developed a methodology to address this issue. Projects are grouped according to their expected useful lives. For example, parking lot repavings might be placed into the 5-Year Useful Life category, roof repairs into the 10-Year Useful Life category, and new penitentiaries into the 20-Year Useful Life category. Once projects have been classified, the project costs are added to determine an aggregate amount of proceeds needed for each category. A level debt service schedule is developed for each category. This schedule assumes bonds issued for projects in the 5-Year Useful Life category are retired in five years, bonds in the 10-Year category are retired in 10 years, and so forth. An example of the effect of this approach is shown in Exhibit 2, which depicts the preliminary issue structure for the State's 1995 Series A General Obligation Bonds. Note that the effect of structuring the maturity schedule in this manner is to create a descending overall debt service schedule, which steps down at five- or ten-year intervals corresponding to the useful life categories.
Decisions must also be made pertaining to when debt service payments will begin and the amount that will be paid each year. Most issues pay interest semi-annually and principal annually. In defining the specific date on which debt service payments will begin, factors such as the timing of payments on outstanding bonds and the government’s projected annual cash flow are important. Debt service payments can be timed to match receipts of intergovernmental grants or fiscal year appropriations.

In general, the date of issuance will not coincide with the schedule of debt service payments, so that the first interest payment will either be sooner than six months from the issue date (a short coupon or stub period), or later than six months (a long coupon or stub period). It is important to understand the effect of whichever option is chosen. The true interest cost of the bond issue is one factor that should be examined. Under certain market conditions, issuers might pay an interest rate penalty for bonds with short or long coupons. Internal administrative or budgetary considerations should also be evaluated. For example, a long coupon will result in the need to make a higher debt service payment than would normally be
Capitalized Interest

required, which could be difficult to make in constrained fiscal environments.

In the municipal market, construction financing and permanent financing are usually funded through one long-term bond issue. Capital facilities expected to generate revenues to be used in repaying the debt have special requirements that need to be considered in the structuring process. Until the facility is operational, it will not be able to generate the required revenues needed to pay debt service. In this case, issuers will sometimes choose to “capitalize” interest. The par amount of the issue is increased so that bond proceeds are available to make these payments until the facility produces sufficient revenue to meet debt service payments.

A feasibility study can be an important resource for the issuer in estimating the timing and amount of revenues that will be available to pay debt service. A feasibility study is a report, often prepared by an outside consultant, that documents the need for a facility, including estimates of revenues expected to be generated, operational requirements, and other important aspects of the project. The feasibility study will also address the technical viability of the project.

Serial and Term Bonds

Municipal bond offerings consist of serial bonds, term bonds, or a combination of the two. A serial bond structure is one in which a certain amount of principal comes due in annual installments. A term bond bundles principal payments into one large maturity. Term bonds tend to be attractive to large, institutional investors.

In the municipal market, the yield curve is generally positively sloped, with a steeper slope in early years and flattening out in longer maturities. As a result, having some serial bonds with shorter maturities and lower interest rates can help to reduce the true interest cost of an issue if term bonds are used in longer maturities. In a flat yield or inverted yield curve environment, there is less or no benefit in having a large amount of serial bonds in early years.

It is common for issuers to use a combination of serial and term bonds. Market conditions will dictate the most cost-effective mix of serial and term bonds. Exhibit 3 is from the front cover of an Official Statement prepared in connection with the issuance of Sewer Revenue Bonds by the City of Portland, Oregon. The issue consists of 16 serial maturities,
from 1997 to 2012, and one term bond maturing in 2015. Note the ascending yields on the serial bonds by maturity, reflecting the positive slope of the yield curve.

### Exhibit 3
**MATURITY SCHEDULE FOR CITY OF PORTLAND SEWER REVENUE BONDS**

<table>
<thead>
<tr>
<th>Due June 1</th>
<th>Principal Amount</th>
<th>Interest Rate</th>
<th>Price or Yield</th>
<th>Due June 1</th>
<th>Principal Amount</th>
<th>Interest Rate</th>
<th>Price or Yield</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997</td>
<td>$5,130,000</td>
<td>7.00%</td>
<td>4.60%</td>
<td>2005</td>
<td>$10,660,000</td>
<td>5.65%</td>
<td>100%</td>
</tr>
<tr>
<td>1998</td>
<td>6,545,000</td>
<td>7.00</td>
<td>4.80</td>
<td>2006</td>
<td>11,265,000</td>
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<td>100</td>
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<tr>
<td>1999</td>
<td>7,470,000</td>
<td>7.00</td>
<td>5.00</td>
<td>2007</td>
<td>11,910,000</td>
<td>5.95</td>
<td>100</td>
</tr>
<tr>
<td>2000</td>
<td>8,110,000</td>
<td>6.50</td>
<td>5.15</td>
<td>2008</td>
<td>12,605,000</td>
<td>5.95</td>
<td>100</td>
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<tr>
<td>2001</td>
<td>8,640,000</td>
<td>5.25</td>
<td>100</td>
<td>2009</td>
<td>13,360,000</td>
<td>6.05</td>
<td>100</td>
</tr>
<tr>
<td>2002</td>
<td>9,090,000</td>
<td>5.35</td>
<td>100</td>
<td>2010</td>
<td>14,160,000</td>
<td>6.10</td>
<td>100</td>
</tr>
<tr>
<td>2003</td>
<td>9,580,000</td>
<td>5.45</td>
<td>100</td>
<td>2011</td>
<td>14,675,000</td>
<td>6.15</td>
<td>100</td>
</tr>
<tr>
<td>2004</td>
<td>10,100,000</td>
<td>5.55</td>
<td>100</td>
<td>2012</td>
<td>15,580,000</td>
<td>6.20</td>
<td>100</td>
</tr>
</tbody>
</table>

$81,120,000 6.25% Term Bonds Due June 1, 2015 @ 100%

Most term bonds provide for an orderly amortization of principal prior to the final stated maturity. Portions of the term bond will be retired in installments prior to the final maturity date through a mandatory redemption process. The official statement will set forth a schedule identifying amounts of principal subject to mandatory redemption (sometimes referred to as mandatory sinking fund redemption). The official statement will also describe how bonds are to be redeemed. A common procedure is for bonds to be selected at random for redemption; on the redemption date, the final interest payment plus the par amount of the bonds are returned to investors. Exhibit 4 sets forth the mandatory sinking fund redemption schedule for the Sewer Revenue Bonds described above.

### Exhibit 4
**MANDATORY SINKING FUND REDEMPTION SCHEDULE FOR CITY OF PORTLAND SEWER REVENUE BONDS**

<table>
<thead>
<tr>
<th>Redemption Date (June 1)</th>
<th>Principal Amount to be Redeemed</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>$16,540,000</td>
</tr>
<tr>
<td>2014</td>
<td>31,310,000</td>
</tr>
<tr>
<td>2015 (final maturity)</td>
<td>33,270,000</td>
</tr>
</tbody>
</table>
With a competitive bond sale, many issuers have found it advantageous to provide flexibility to bidders in determining the combination of serial and term bonds. The Notice of Sale will identify principal amounts maturing each year, but permits submission of bids with any combination of serial or term bonds. Sample language is shown below.

...Proposals for the Bonds may contain a maturity schedule providing for any combination of serial bonds and term bonds, subject to mandatory redemption, so long as the amounts of principal maturing or subject to mandatory redemption in each year conforms to the maturity schedule set forth above.

This approach can result in a more favorable true interest cost for the bonds, since it allows bidders to submit proposals that take into account investor demand for either serial or term bonds of different maturities. Issuers may find that trustee or paying agent fees will be higher if various maturities of bonds are grouped into a term bond because of the added administrative requirements involved in calling bonds subject to mandatory redemption.

Interest on municipal securities may be paid periodically -- usually semiannually -- or compounded and paid at final maturity. Conventional tax-exempt bonds pay a stream of interest income periodically throughout the life of the bonds. On the final maturity date, investors receive the final interest payment and the principal amount invested.

Issuers are able to defer making principal and interest payments by using either zero coupon bonds or capital appreciation bonds (CABs). Zero coupon bonds are issued at a deep discount from par, and they accrete to their full value at final maturity. Capital appreciation bonds are issued at par, and interest accrues at the bond’s stated interest rate until the final maturity and is paid in a lump sum.

While bond calculations for these two types of securities are mathematically the same, there can be an important difference between them, depending on state or local laws governing bond issuance. Because zero coupon bonds are issued at a deep discount, the amount of proceeds received is significantly less than the par amount of the issue. Issuers of CABs receive the par amount of the bonds (less any issuance costs paid from bond proceeds). Thus, issuers of zero coupon bonds would
need to issue a higher par amount of bonds relative to issuers of CABs to receive a given amount of proceeds, even though both options would produce the same debt repayment schedule. Issuers subject to statutory limitations requiring that debt be issued at a price equal or near to the par amount are prohibited from issuing zero coupon bonds. Issuers facing statutory caps on the amount of debt that may be issued will want to minimize their use of zero coupon bonds, since the par amount of the issue will be counted against the statutory limit despite the fact that a lesser amount of proceeds is received. It is important to note, however, that in some jurisdictions, there is no legal difference between these two types of securities vis-à-vis the debt limit -- that is, the amount counted against the legal debt ceiling will always be the accreted value in the case of zeros, or the par value plus accrued interest for CABs. Bond counsel should always be consulted if this type of security is being considered.

Zero coupon bonds and CABs are attractive to investors who want to hold these securities until final maturity, and who do not want to be concerned with reinvestment risk. With bonds that pay interest periodically, investors must consider the interest rate environment in which they will reinvest interest earnings, which may be below the interest rate earned on the bonds they are holding. Zero coupon bonds and CABs lock in a reinvestment rate for the life of the issue. Investors in these instruments are subject to market risk, however. Investors who want to sell the securities prior to maturity may face a different interest rate environment than was present at the time when the securities were purchased. If interest rates have increased, investors desiring to sell these securities would be forced to sell the securities at a lower price than the original offering price.

Zero coupon bonds and CABs are subject to greater price volatility than conventional full coupon bonds that pay interest periodically. In falling interest rate environments, the price of these securities rises faster than the price of full coupon bonds. The need to reinvest coupon payments at lower interest rates restrains price appreciation of full coupon bonds relative to zeros and CABs. In rising interest rate environments, the price of zeros and CABs falls more rapidly than the price of comparable full coupon bonds. In this case, the ability to

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6 Mathematically, a bond's stated yield-to-maturity is only achieved if the semi-annual interest payments can be reinvested at that yield until the maturity date.

7 Market risk is also a concern for securities that pay interest periodically, but will be more significant for zeros and CABs.
reinvest coupon payments at higher yields lessens the amount of price depreciation of current coupon bonds relative to zeros and CABs. Price volatility generally has the effect of increasing the yield that investors will demand to purchase zeros and CABs. This yield premium will vary depending on the shape of the yield curve and the maturity of the debt.

Because no interest or principal is paid until maturity, zeros coupon bonds and CABs are useful for a debt program in which the issuer wants to minimize its debt service payments in the early years. Thus, they may be an alternative to capitalizing interest. The issuer would need to compare the additional costs of issuing more bonds in the case of capitalized interest relative to any yield premium associated with the use of CABs. Issuers with uneven debt service schedules with respect to their outstanding debt portfolio may include zeros or CABs in a new issue in order to level out total debt service payments. Zeros and CABs can also be combined with serial bonds to create a cost-effective, level debt service structure. Issuers planning to include this type of instrument need to assure themselves that market conditions are such that the bonds can be sold cost-effectively.

Bonds may be sold at an original issue discount (OID) or premium. Bonds sold at an original issue discount have an initial offering price that is below the par or face amount of the bonds. Investors agree to accept a lower coupon interest rate than would otherwise be paid for bonds without an OID in exchange for a discount on the price of the bonds. Conversely, bonds sold at a premium have an offering price that exceeds the par value. Investors agree to pay a higher price for these securities in return for a higher coupon interest rate.

The use of an original issue discount (OID) or premium will depend to a great extent on the method of sale. Issuers have greater flexibility in structuring an issue to include original issue discounts or premiums in a negotiated sale process than in a competitive sale process. With a negotiated sale, the issuer has the benefit of input from an underwriter who is familiar with investor appetites for various types of securities and who understands particular issuer objectives that would support the use of discounts or premiums.

The decision to issue bonds at a premium or discount may be based on legal issues, market conditions, or other factors. One reason that issuers consider the use of an OID is to reduce the true interest cost of the issue relative to an issue sold at par.
Bonds issued at an original issue discount when interest rates are falling are attractive to some investors, who may be willing to accept a lower coupon in return for the potential of more capital appreciation. Bonds sold at a discount also offer some call protection to investors (discussed in more detail in the next section), which may enhance their marketability. Selling bonds at an original issue discount will result in less gross proceeds (i.e. the amount of proceeds before subtracting the underwriter’s discount and other issuance costs) than the par amount of the issue. The issuer will, nevertheless, be required to pay back the full par amount of the bonds at maturity.

Governments may choose to issue premium bonds in order to squeeze additional proceeds from an issue, for example, to pay for certain issuance costs. Premium bonds bear a higher coupon interest rate; thus, the issuer pays higher debt service costs over the term of the bonds relative to bonds sold at par. Moreover, there may be an interest rate penalty for premium bonds depending on market conditions.

In a competitive offering, decisions on the use of an original issue discount or premium in reoffering the bonds to investors are made primarily by the winning underwriting firm or syndicate. Firms bidding on an issuer’s bonds will propose coupon interest rates for various maturities and the price offered for bonds at those interest rates. Once the bonds have been awarded, the winning bidder may choose to reoffer the securities to investors at either a discount or premium in order to capture certain marketing benefits. In this case, a reoffering scale will be formulated specifying the coupon interest rate and yield or price for each maturity.

The redemption provisions of a bond offering are an important component of an effective debt management program, and must be carefully considered. A bond issue may include mandatory and extraordinary redemption provisions. Mandatory redemption provisions, discussed earlier, are often specified in connection with a term bond. Extraordinary mandatory redemption provisions may be included to address unforeseen circumstances, such as destruction of a revenue-generating facility.

Bonds may also be structured with an optional redemption feature. Issuers want to have the ability to redeem bonds early if interest rates have declined since the bonds were issued, or to change restrictive or burdensome covenants. A typical call option may be exercised after ten years, sometimes at a premium if redeemed in the tenth or eleventh year. The
premium is usually in the range of 101-103 percent of the par amount, and declines each year by \( \frac{1}{2} \) or 1 percent until the bonds may be called at par. Some issuers also reserve the right to call bonds at par. The rights and obligations of the issuer with respect to redemption of bonds must be clearly described in the official statement.

Issuers may receive conflicting advice regarding whether to give up their call rights for certain bonds or whether to include a call premium. Consider first the choice of issuing callable or non-callable bonds. Structuring bonds to include a call provision may result in a higher interest rate relative to non-callable bonds, depending on market conditions and the call premium. Issuers are more likely to exercise their call option when interest rates have declined. Thus, investors would be faced with having to reinvest at a lower rate of return for a comparable investment for the remaining term of the bonds. To compensate for this risk, investors may demand a higher interest rate for callable bonds. In low interest rate environments, issuers may be advised to consider giving up their call right in exchange for a potentially lower coupon interest rate for the non-callable bonds.

Issuers may also be urged to include a call premium as a marketing feature for callable securities. The call premium provides some protection for investors by making it more difficult for an issuer to refund the bonds when interest rates have declined. The call premium paid to investors reduces the present value savings of a refunding: the higher is the call premium, the lower is the present value savings of the refunding. This can be particularly problematic in the case of an advance refunding. Under federal tax law, the issuer will be required to call advance refunded bonds issued after 1985 on the first redemption date where present value savings are achieved, regardless of the call premium. Bonds issued before 1985 that are advance refunded must be called if the call premium is 3 percent or less (i.e., the bonds are callable at 103 or less).

Extreme caution should be exercised before agreeing to give up call rights. Unless there is compelling evidence to suggest that selling noncallable bonds will result in significant interest cost savings, the issuer will want to preserve its ability to call bonds in the future in order to take advantage of declining interest rates or in the event that bond covenants need to be revised. Moreover, issuers should work with their finance team to evaluate the earliest time when bonds may be called at par without an interest rate penalty. Including a par call option can
SIZING THE ISSUE

In sizing the bond offering, the issuer must consider all of the items that will be paid from bond proceeds, and the magnitude of interest earnings on unspent proceeds that can be used toward project costs. As has been discussed, the structure of the offering will affect the sizing calculation. Exhibit 5 shows the different elements that are part of the bond sizing.

Exhibit 5
ELEMENTS IN THE BOND SIZING PROCESS

Adapted from *Mun-Ease User Guide, Volume I*

Construction and Other Up Front Costs

In large part, the size of the issue is determined by the cost of the capital project to be undertaken. The cost of the project will often be estimated in current year dollars. However, if the project will take several years to construct, the cost of the project may increase due to the effects of inflation. These inflationary effects should be considered when sizing the issue.

In addition to the construction cost of the project, issuers often decide to finance other costs with bond proceeds. It is common...
for issuance costs, including underwriting compensation, fees to bond counsel, a financial advisor, a trustee and paying agent, rating agencies, and other issuance costs to be paid from bond proceeds. Credit enhancement premiums -- especially for bond insurance which is often payable as an up-front fee -- are another expense often paid from bond proceeds. Revenue bond issuers required to maintain a debt service reserve may use bond proceeds to fund this account. Finally, if the issuer is planning to capitalize interest, enough proceeds must be available to cover this amount.

Sizing the bond issue generally takes into account investment earnings on the bond proceeds. A project is said to be “net funded” if it relies on the investment earnings to generate sufficient funding for the project. As a result, the amount of bonds issued will be less than the total cost of the project. Issuers choosing to net fund the project must assure themselves that investment earnings will be sufficient to cover the balance of construction costs not funded with bond proceeds.

While good estimates of project costs are an obvious requirement in order to accurately size a bond offering, it is no less important to develop good estimates of when bond proceeds will be spent and the interest rate at which unspent bond proceeds can be invested. Typically, bond proceeds are expended as various project milestones are reached requiring a payment to vendors. An engineering study can be helpful in estimating when these milestones will occur and the amounts that will be paid at each point.

Once a drawdown schedule has been developed, the issuer can design a maturity schedule for bond proceeds and assign corresponding interest rates for various maturities of proceeds. For bond calculation software packages that require the issuer to input one interest rate for investment earnings, a blended rate can be calculated based on the various terms over which bond proceeds are expected to be invested. This blended yield should reflect market conditions, and not be based on an assumption that bonds can necessarily be invested at the same rate as the arbitrage yield limit. In a steep yield curve environment, such an assumption can produce inaccurate sizing results.

It is common for municipal bonds to be issued in $5,000 increments; hence, bond offerings are generally sized so that the amount of principal coming due in each year is in multiples...
of $5,000. Because the amount of costs covered does not always exactly equal an amount that is divisible by $5,000, the amount of a bond offering is frequently rounded up to the nearest $5,000. The rounding amount sometimes is included in the costs of issuance, or may be shown as a "contingency" line item in tables depicting the uses of funds in the Official Statement.

Exhibit 6 summarizes assumptions used to size a hypothetical debt-financed project with an estimated construction cost of $100,000,000. All costs of issuance plus credit enhancement fees are assumed to be paid from bond proceeds. The issue includes sufficient proceeds to fund a debt service reserve, as illustrated. Because the financed facility is not expected to be fully operational until June 1996, nearly two years from the date the bonds are issued, interest has been capitalized through October 1, 1996, when revenues from the project are projected to be available for debt service payments. In this simplified example, the interest rate for investment earnings on the capitalized interest fund is assumed to be 5 percent per year, and all earnings remain with the fund. The same interest rate is assumed for proceeds in the construction fund. Interest earnings are applied to the project cost, thereby decreasing the amount of proceeds that must be issued to cover construction costs.

Exhibit 6
ASSUMPTIONS FOR SIZING EXAMPLE

<table>
<thead>
<tr>
<th>Construction Costs</th>
<th>$100,000,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Issuance Costs:</td>
<td></td>
</tr>
<tr>
<td>Underwriter's Spread</td>
<td>$10.00/$1,000 bond</td>
</tr>
<tr>
<td>Other Issuance Costs</td>
<td>$500,000</td>
</tr>
<tr>
<td>Credit Enhancement</td>
<td>0.50% of total debt service (less accrued and capitalized interest)</td>
</tr>
<tr>
<td>Debt Service Reserve</td>
<td>Least of 10% of principal, 125% of annual debt service, or maximum annual debt service</td>
</tr>
<tr>
<td>Capitalized Interest</td>
<td>From date of issuance through October 1, 1996 (24 months)</td>
</tr>
<tr>
<td>Interest Rate - Investments</td>
<td>5%/year</td>
</tr>
<tr>
<td>Interest Rate - Construction</td>
<td>5%/year</td>
</tr>
</tbody>
</table>
Based on all of the foregoing assumptions, the size of the bond offering is $121,640,000, as shown in Exhibit 7. Exhibit 8 and Exhibit 9 display the construction drawdown schedule and capitalized interest fund balance, respectively, and how bond proceeds and interest earnings are applied to meet expenditures.

Note that in this example, certain decisions have been made regarding the structure of the issue, such as the use of level debt service payments and no original issue discount. Changes in either of these assumptions would result in a change to the amount of proceeds needed. Thus, the structure of an issue is critical in determining the amount of bonds to issue.

**Tax Considerations**

Governmental issuers are subject to Internal Revenue Service (IRS) regulations pertaining to tax-exempt bonds. When sizing the bond issue, there are certain regulations that must be followed. One set of regulations concerns the requirement to calculate and rebate arbitrage earnings on tax-exempt bond proceeds to the federal government. Arbitrage refers to the difference between the yield on tax-exempt bonds and the investment income earned on bond proceeds. Arbitrage profits are earned when the yield on tax-exempt bonds is lower than the yield on proceeds invested in taxable securities. In general, issuers are not permitted to retain arbitrage profits. There are some notable exceptions to this regulation. Issuers are permitted to keep arbitrage profits if any of the following conditions are met:

1. The governmental entity is a taxing authority that expects to issue $5 million or less of tax-exempt debt in each calendar year;

2. The issuer is able to expend all proceeds of a tax-exempt issue within 6 months;

3. The issuer is able to expend all proceeds of an issue for capital projects (including industrial development bonds and qualified mortgage bonds) over an 18-month period according to the following schedule:

   - 6 months: 15%
   - 12 months: 60%
   - 18 months: 100%

4. The issuer is able to expend the proceeds of governmental purpose bonds, 501(c)(3) bonds, or
Exhibit 7
HYPOTHETICAL ISSUE CHARACTERISTICS/ SOURCES & USES OF FUNDS

GENERAL INFORMATION

Description: Hypothetical Construction Project
Bond Denomination: $5,000.00
Sizing Rule: Lesser of (1) 10% of principal, (2) maximum annual debt service, (3) 125% of average annual debt service
Bond Rating: A

Dates:
Bond Issue Date: 10/1/94
Delivery Date: 10/15/94
1st Coupon Date: 4/1/95
1st Principal Payment: 10/1/97
Last Maturity Date: 10/1/16
No CABs in Bond Issue

Construction Costs:
Total project costs $100,000,000.00
Prior costs $-
Less: Interest earned in fund and applied to construction draws $(4,854,902.58)
Net Construction Costs $95,145,097.42
Nonrestricted Yield = 5.00%

Restricted Accounts:
Debt service reserve fund sizing rule: Average yearly debt service
Capitalize interest through: 10/01/1996 (4 periods of interest)
Restricted yield = 5.00%
Net deposit to Debt Service Reserve Fund $10,624,002.50
Net deposit to Contingency Fund $1,841.80

Cost of Issuance:
Underwriter Spread: $10,000/1,000 $1,216,400.00
Bond Insurance: 0.50% (net of accrued and cap. interest) $1,081,750.16
Other issuance costs $500,000.00

SOURCES AND USES OF FUNDS

Sources:
Par amount of bonds $121,640,000.00
Accrued interest $289,963.70
Original Issue Discount $-
TOTAL SOURCES $121,929,963.70

Uses:
Accrued interest $289,963.70
Construction costs $100,000,000.00
Less: Interest earned on construction fund $(4,854,902.58)
Capitalized interest fund (net of interest) $13,070,908.12
Debt service reserve fund $10,624,002.50
Contingency fund $1,841.80
Underwriter's discount $1,216,400.00
Other costs of issuance $500,000.00
Credit enhancements (0.50%) $1,081,750.16
TOTAL USES $121,929,963.70
### Exhibit 8
CONSTRUCTION DRAWS FOR SIZING CALCULATIONS

<table>
<thead>
<tr>
<th>Draw #</th>
<th>Draw Date</th>
<th>Beg. Fund Balance</th>
<th>Interest Earnings</th>
<th>Draw Requirements</th>
<th>Net Draw Amount</th>
<th>Ending Balance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deposit</td>
<td>10/15/94</td>
<td>$ -</td>
<td>$ -</td>
<td>$ -</td>
<td>$ -</td>
<td>$ -</td>
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<td>1</td>
<td>11/1/94</td>
<td>95,145,097.42</td>
<td>602,295.72</td>
<td>5,000,000.00</td>
<td>4,397,704.28</td>
<td>90,747,393.14</td>
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<tr>
<td>2</td>
<td>12/1/94</td>
<td>90,747,393.14</td>
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<td>249,987.53</td>
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<tr>
<td>3</td>
<td>1/1/95</td>
<td>90,497,405.61</td>
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<td>1,000,000.00</td>
<td>628,796.35</td>
<td>89,870,609.26</td>
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<td>4</td>
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<td>1,129,381.20</td>
<td>88,741,228.06</td>
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<td>5</td>
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<td>1,500,000.00</td>
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<td>87,607,189.38</td>
</tr>
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<td>6</td>
<td>4/1/95</td>
<td>87,607,189.38</td>
<td>361,284.64</td>
<td>2,000,000.00</td>
<td>1,638,715.36</td>
<td>85,968,474.02</td>
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<td>7</td>
<td>5/1/95</td>
<td>85,968,474.02</td>
<td>354,526.72</td>
<td>3,000,000.00</td>
<td>2,645,473.28</td>
<td>83,323,000.74</td>
</tr>
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<td>8</td>
<td>6/1/95</td>
<td>83,323,000.74</td>
<td>343,617.01</td>
<td>5,000,000.00</td>
<td>4,658,382.99</td>
<td>78,666,617.75</td>
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<td>9</td>
<td>7/1/95</td>
<td>78,666,617.75</td>
<td>324,414.48</td>
<td>10,000,000.00</td>
<td>9,675,585.52</td>
<td>68,991,032.23</td>
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<td>10</td>
<td>8/1/95</td>
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<td>284,513.18</td>
<td>10,000,000.00</td>
<td>9,715,486.82</td>
<td>59,275,545.42</td>
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<tr>
<td>11</td>
<td>9/1/95</td>
<td>59,275,545.42</td>
<td>244,447.34</td>
<td>15,000,000.00</td>
<td>14,755,552.66</td>
<td>44,519,992.76</td>
</tr>
<tr>
<td>12</td>
<td>10/1/95</td>
<td>44,519,992.76</td>
<td>183,596.69</td>
<td>15,000,000.00</td>
<td>14,816,403.31</td>
<td>29,703,589.45</td>
</tr>
<tr>
<td>13</td>
<td>11/1/95</td>
<td>29,703,589.45</td>
<td>122,495.09</td>
<td>10,000,000.00</td>
<td>9,877,504.91</td>
<td>19,826,084.54</td>
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<td>14</td>
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<td>81,761.10</td>
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<td>1/1/96</td>
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<td>51,188.91</td>
<td>7,500,000.00</td>
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<tr>
<td>16</td>
<td>2/1/96</td>
<td>4,959,014.54</td>
<td>40,985.46</td>
<td>5,000,000.00</td>
<td>4,959,014.54</td>
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</tr>
<tr>
<td><strong>TOTALS</strong></td>
<td></td>
<td>$ 4,854,922.58</td>
<td></td>
<td>$ 100,000,000.00</td>
<td>$ 95,145,027.42</td>
<td></td>
</tr>
</tbody>
</table>

### Exhibit 9
CAPITALIZED INTEREST FUND BALANCE REPORT

<table>
<thead>
<tr>
<th>Coupon Date</th>
<th>Beginning Balance</th>
<th>Interest Earnings</th>
<th>Debt Service Requirements</th>
<th>Interest From Debt Svc. Reserve and Contingency</th>
<th>Net Payment -- Cap. Interest</th>
<th>Ending Balance</th>
</tr>
</thead>
<tbody>
<tr>
<td>4/1/95</td>
<td>$ 13,070,908</td>
<td>$ 301,068.66</td>
<td>$ 3,726,104.75</td>
<td>$ 244,981.15</td>
<td>$ 3,483,123.60</td>
<td>$ 9,888,851.06</td>
</tr>
<tr>
<td>10/1/95</td>
<td>9,888,851</td>
<td>247,221.28</td>
<td>3,726,104.75</td>
<td>265,642.21</td>
<td>3,462,462.54</td>
<td>6,873,609.80</td>
</tr>
<tr>
<td>4/1/96</td>
<td>6,873,609.80</td>
<td>168,840.25</td>
<td>3,726,104.75</td>
<td>265,642.21</td>
<td>3,462,462.54</td>
<td>3,377,967.51</td>
</tr>
<tr>
<td>10/1/96</td>
<td>3,377,967.51</td>
<td>84,449.69</td>
<td>3,726,104.75</td>
<td>265,642.21</td>
<td>3,462,462.54</td>
<td>(25.34)</td>
</tr>
</tbody>
</table>
private activity bonds for governmentally owned facilities according to the following schedule:

<table>
<thead>
<tr>
<th>Duration</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 months</td>
<td>10%</td>
</tr>
<tr>
<td>12 months</td>
<td>45%</td>
</tr>
<tr>
<td>18 months</td>
<td>75%</td>
</tr>
<tr>
<td>24 months</td>
<td>100%</td>
</tr>
</tbody>
</table>

To be eligible for this spending exception, at least 75 percent of the issue must be used for construction purposes.

Issuers may want to size the issue to take advantage of these spending exceptions, but should consult bond counsel to be sure all the requirements can be met.

It is also important for issuers to develop good estimates of the amount of proceeds they will actually need so as not to run afoul of IRS regulations pertaining to overissuance of tax-exempt bonds. The following conditions identified by the IRS would indicate an overissuance:

1. Proceeds in excess of what is reasonably needed to construct the project, excluding a minor portion of the issue (the lesser of 5 percent of bond proceeds or $100,000)

2. Bonds that do not meet the following conditions:
   a. At least 85 percent of the proceeds are expended within three years;
   b. The issuer has a binding obligation to a third party within six months of issuance to spend at least 5 percent of the proceeds; and
   c. The issuer proceeds with due diligence in completing the project.

3. Bonds which exceed the safe harbors against creation of replacement proceeds.

Again, bond counsel should be consulted to ensure that the issuer has complied with IRS regulations on overissuance.

In order to avoid overissuance, many jurisdictions issue bonds to meet the annual expenditure schedule of the project rather than the total cost of the project. This approach makes sense for large capital projects or programs that are expected to be undertaken over several years. Because issuing less than the total amount needed will result in having to issue more bonds at a later point in time, overall issuance costs for the project will be higher. In certain markets, using short-term financing,
such as bond anticipation notes, and refinancing later with long-term debt may be a cost-effective option when financing projects incrementally.

Governments often have particular financing objectives they want to achieve when issuing bonds, and design structures to accomplish these objectives. While elaborate structural features are relatively common for revenue bonds, beneficial structuring options exist even for "plain vanilla" general obligation bonds. This section will focus on specific objectives defined by two jurisdictions -- Boston, Massachusetts and Portland, Oregon -- and the sizing and structuring options they considered in attempting to meet these goals.

In some cases, the goals identified for a particular financing create conflict when trying to optimize the structure of the offering. How these issues are resolved will depend on the particular policies and priorities of individual jurisdictions. For example, the City of Portland decided to level out total debt service schedule by "wrapping" debt service on the new debt around outstanding payments, which has the effect of backloading principal payments. This structure was chosen in order to reduce near-term revenue requirements and rate impacts. In making this decision, the city decided that these benefits outweighed potential credit disadvantages stemming from extending the average life of the bonds. Similarly, the City of Boston was required to balance its desire to retire principal rapidly with budgetary constraints regarding the percentage of the budget used for debt service payments. Having an adopted debt policy can provide guidance to the finance officer in ensuring that the structure is consistent with other goals of the state or local government.

In preparing to issue its 1994 Series B General Obligation Bonds, the City of Boston identified a number of goals that it wanted to meet, including:

- Meeting its FY 1995 capital funding needs;
- Addressing the city's debt management policy objectives;
- Completing the issue within the budgetary constraints of the 1995 debt service appropriation; and
- Retiring principal as rapidly as possible.

Thus, a central task in structuring this issue was to develop a debt service schedule that supported capital needs within
budgetary constraints while achieving policy and financial goals.

One of the city’s debt management policies is to match the useful life of assets being financed with the term of the bonds. This objective was accomplished by grouping capital projects based on an economic life of five, ten, fifteen, or twenty years. These categories served as the basis for designing an initial principal repayment schedule.

The repayment schedule was then evaluated and refined based on other objectives. For example, the pace of debt retirement was assessed. Budgetary impacts were also considered. Annual cash flow impacts within the budget year was one factor evaluated in determining the timing of debt service payments. Another consideration was the city’s debt management policy that limits annual debt service to 6 percent of the city budget. The city selected a debt service payment cycle that best suited its general operating funds cash flow, and one that evenly distributed principal payments throughout the year. This payment cycle was chosen to move the first principal payment into the next fiscal year to meet the 6 percent objective.

The resulting debt service repayment schedule retires approximately 40 percent of all outstanding principal within five years of the dated date of the Series B Bonds, and 70 percent within 10 years. The principal amortization schedule for the 1994 bonds and other outstanding debt is illustrated in Exhibit 10.

Exhibit 10
CITY OF BOSTON PRINCIPAL REPAYMENT SCHEDULE

<table>
<thead>
<tr>
<th>Principal ($ in thousands)</th>
</tr>
</thead>
<tbody>
<tr>
<td>60,000</td>
</tr>
<tr>
<td>50,000</td>
</tr>
<tr>
<td>40,000</td>
</tr>
<tr>
<td>30,000</td>
</tr>
<tr>
<td>20,000</td>
</tr>
<tr>
<td>10,000</td>
</tr>
<tr>
<td>0</td>
</tr>
</tbody>
</table>

1994 Series B Bonds
Outstanding Bonds
City of Portland,
Oregon Sewer
Revenue Bonds:

Structuring Debt
Service Payments to
Achieve Sizing and
Financial Planning
Objectives

There are circumstances in which an issuer may need to issue more bonds than would be supported through a level debt service approach. The issue can be structured and debt service payments sculpted to permit more bonds to be issued, while remaining within the jurisdiction’s financial constraints.

In issuing its 1994 Series A Sewer Revenue Bonds, the City of Portland, Oregon had two broad financing objectives. One goal was to maximize the amount of bond proceeds that could be used for capital construction. The city was concerned that future bond issues for sewer system capital improvements could be delayed for a period of up to two years; thus, a decision was made to structure the issue to obtain additional proceeds. The size of the offering was doubled, from its originally planned $100-125 million to $250 million. Approximately $2 million of additional proceeds -- enough to cover issuance costs -- were obtained by issuing a small amount of premium bonds. Exhibit 3 (see page 18) shows the coupons offered for the 1997-2000 maturities in exchange for this higher amount of proceeds.

A second important objective was to keep debt service at or below the levels specified in the city’s multi-year financial plan. Note that the decision to increase the size of the bond issue would impact the debt service schedule. The city was therefore required to devise a repayment structure that could meet higher-than-planned debt service payments, yet remain within financial planning targets.

The city employed several structuring techniques to ensure that debt service was consistent with projections established in the financial plan. The city chose to capitalize interest for a period of 16 months from the date of issue. In addition, principal payments were deferred for three years. These structural features permitted the city to gradually increase debt service over a four-year period to minimize sewer rate increases. The debt service schedule is as follows:

<table>
<thead>
<tr>
<th>FY</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995</td>
<td>$ 0.0 million</td>
</tr>
<tr>
<td>1996</td>
<td>$ 10.2 million</td>
</tr>
<tr>
<td>1997</td>
<td>$ 20.3 million</td>
</tr>
<tr>
<td>1998</td>
<td>$ 21.4 million</td>
</tr>
</tbody>
</table>

Another objective for this financing was to level out the total sewer revenue bond debt service by “wrapping” the new debt around existing debt service. Exhibit 11 shows how this was accomplished. Note that the effect of this debt service
structure is to push out debt service payments, extending the average life of the issue and increasing interest costs. An issuer contemplating such an approach should carefully weigh the goals it hopes to achieve against potential credit concerns.

Exhibit 11
CITY OF PORTLAND
DEBT SERVICE ON NEW AND OUTSTANDING BONDS

SUMMARY
The process of structuring and sizing the bond issue is a fundamental part of the bond issuance process. Devising an optimal approach to structuring and sizing can enhance the issuer’s ability to maximize the amount of bond proceeds for construction purposes, to meet cash flow requirements, to reduce financing costs, or to achieve long-term policy and financial goals. Issuers need to exercise caution, however, to assure themselves that they understand the costs of whatever approach they choose. A careful examination of the implications of structuring and sizing options is essential in order to adequately compare the costs and benefits of various alternatives. Particular attention should be paid to the long-term effects of structuring and sizing decisions, including whether these decisions affect credit quality, preserve the issuer’s flexibility to respond to changing conditions in the future at an acceptable level, or are administratively workable. When properly used, structuring and sizing techniques can serve as tools to more effectively manage the debt program.