GENERAL PLANNING CONSULTANT

TECHNICAL MEMORANDUM 89.4.7

FINITE BONDING MODELS FOR PHASE II

BENEFIT ASSESSMENT DISTRICT PROGRAM

(REVISED)

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Southern California Rapid Transit District

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1.0 INTRODUCTION

One of the major funding mechanisms for Metro Rail is the Benefit Assessment District concept. Properties in the vicinity of Metro Rail stations will receive economic benefits attributable to their proximity to stations. Benefit Assessment is a program designed to capture a portion of the benefits for construction of the Metro Rail system. In each station area, the number of assessable square feet of space is determined. Multiplication of the number of square feet by an assessment rate yields the annual income from this source.

It is planned to issue bonds at such levels that the annual assessment income will provide debt service on the issue. The SCRTD suggested that GPC staff develop some programs that could be used to investigate various scenarios for the bonding program. A set of three programs are presented each of which are described in more detail in this report:

1) Mid-Range Financing Model: This model is designed to provide a financing program for Phase II of Metro Rail which would take advantage of cash flow, short-term financing, and medium-term bonding.

2) Long-Term Bonding With No Deferment: This model is designed to provide a financing program which would phase in the assessment program while taking advantage of long-term (20 year) bonds.

3) Long-Term Bonding With Deferred Assessment: This model is designed to provide a financing program which would capitalize interest on the bonds and defer all payments until the completion of construction of Phase II.

All the programs run on MULTIPLAN, Version 3.0 which requires DOS 2.1 or later. All three models are interactive. The user inputs a wide variety of data considered representative and calculates the annual assessment rates necessary to support the program. Conversely it is possible to set assessment rates and determine the bond proceeds that may be raised. This can be done in the context of a sensitivity analysis. A brief discussion of bond characteristics is included in Appendix A of this report.

The user must be aware that these are planning models to provide District staff with guidance in the development of the bonding program for a Benefit Assessment District. Representative data are entered and reasonable results are anticipated. Please refer to Technical Memorandum 88.4.9 (Revised) Bonding Models for Benefit Assessment District Program (June, 1988) for additional information.

2.0 MID-RANGE FINANCING MODEL

This bonding model would actually consist of a combination of cash flow, Revenue Anticipation Notes (RANs), one bond issue of $20 million for eight years, and one bond issue of $15 million for six years. The user should refer to Figure 1 while reviewing the following text. Much of the line-by-line commentary is applicable to the two bonding models which are discussed later. The principal payments are made in equal annual installments for the life of the bond issues.

2.1 Fiscal Years

The program allows for the issuance of bonds over a 7 year period. The model currently suggests a 1992 to 1998 time frame. This is adjusted easily by entering the desired starting year into the cell containing the initial year of 1991. (See cell R8C8 on the spreadsheet.) In general, bond proceeds are assumed to be credited at the start of the fiscal year and debt service payments debited at the end of the fiscal year.

2.2 Proceeds Required From Bonds

The Metro Rail construction program for Phase II calls for the expenditure of funds each fiscal year. It is anticipated that the Phase II construction program will begin in FY 1990 and continue through FY 2000. Each funding partner contributes a portion of the required amount. The user enters the amounts expected from the Benefit Assessment program each fiscal year. Of course, the user may enter bond proceeds in any amount to test the feasibility of various funding scenarios. For each financing model presented in this document, the following schedule of Benefit Assessment District funds for Metro Rail is assumed: $20M in 1993; $20M in 1994; $15M in 1995; and $20M in 1996.

2.3 Debt Service Reserve Fund

The debt service reserve fund is held to make interest and principal payments on the bonds to the extent that the issuing agency is unable to do so in a given year. In the event funds from the reserve fund are used, they must be replaced by the issuing agency in the subsequent year. The reserve fund is required to be maintained at an amount equal to the maximum annual debt service on the bonds in keeping with the opinion of bond counsel relative to interpretation of the Internal Revenue Code of 1986, as amended, and the United States Treasury Regulations proposed or in effect with regard to the bond issue.

Generally, debt service reserve funds are financed with part of the bond issue receipts. However, the debt service reserve funds may be derived from assessment income rather than from bond proceeds in order to reduce annual interest payments on the bonds.

2.4 Discount From Par

Some bonds must be sold at less than par value. Par value is the face value of the bond, often $1,000 or $5,000. An investor may not be willing to pay $1,000 for a bond if the interest rate is low or if risks are high. The user must enter the discount percentage in the

BONDING MODULE

BENEFIT ASSESSMENT RATE CALCULATIONS
MOS-2 ONE/HALF MILE WALK

FISCAL YEARS			1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
PROCEEDS REQUIRED FROM BONDS		$M		0.0	20.0	20.0	15.0	20.0	0.0	0.0																				
DEBT SERVICE RESERVE FUND	0	$M		0.0	0.0	0.0	0.0	0.0	0.0	0.0																				
DISCOUNT FROM PAR	0.00%	$M		0.0	0.0	0.0	0.0	0.0	0.0	0.0																				
COST OF ISSUANCE	2.00%	$M		0.0	0.4	0.4	0.3	0.4	0.0	0.0																				
ADDITIONAL BONDS REQUIRED		$M		0.0	20.4	20.0	15.3	20.0	0.0	0.0																				

DEBT SERVICE REQUIREMENTS TABLE

DEFER INTER	BOND AMOUNT	FISCAL YEAR	DUR (N)	INVEST RATE(I)	DIVIDEND RATE(D)		1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
0	0.0	1992	0	0.1	0.1	$M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0	20.4	1993	8	8.0	10.0	$M	0.0	0.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0	20.0	1994	1	0.1	0.1	$M	0.0	0.0	0.0	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0	15.3	1995	6	8.0	10.0	$M	0.0	0.0	0.0	0.0	3.6	3.6	3.6	3.6	3.6	3.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0	20.0	1996	1	0.1	0.1	$M	0.0	0.0	0.0	0.0	0.0	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0	0.0	1997	0	0.1	0.1	$M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0	0.0	1998	0	0.1	0.1	$M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

TOTAL=75.714

			1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
DEBT SERVICE		$M	0.00	0.00	3.96	23.98	14.38	33.00	28.96	24.75	20.10	15.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
COVERAGE RATIO			N/A	N/A	3.32	3.32	1.73	1.73	1.73	1.73	1.73	1.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
DEBT SERVICE RESERVE FUND		$M	0.00	0.00	3.96	3.96	7.58	7.58	7.58	7.58	7.58	7.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ADMIN COSTS INFLATED BY	4.00% /YR	$M	0.00	0.00	0.50	0.52	0.54	0.56	0.58	0.61	0.63	0.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL OBLIGATIONS		$M	0.00	0.00	8.42	24.50	18.54	33.56	29.55	25.36	20.74	8.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REV. ANTIC. NOTES, I =	8.00%	$M				6.30	5.00	19.80	15.90	11.60	7.00																			
BEGINNING BALANCE		$M	0.00	0.00	0.00	4.71	0.07	0.10	0.06	0.14	0.10	0.09	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INTEREST ON RESERVE FUND	7.80%	$M	0.00	0.00	0.00	0.31	0.31	0.59	0.59	0.59	0.59	0.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INTEREST ON BALANCE	5.50%	$M	0.00	0.00	0.00	0.13	0.13	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ENDING BALANCE		$M	0.00	0.00	4.71	0.07	0.10	0.06	0.14	0.10	0.09	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SQUARE FOOT SCHEDULE (M's) NO GROWTH			50.48	50.48	50.48	50.48	50.48	50.48	50.48	50.48	50.48	50.48	50.48	50.48	50.48	50.48	50.48	50.48	50.48	50.48	50.48	50.48	50.48	50.48	50.48	50.48	50.48	50.48	50.48	50.48
INCOME EXPECTATIONS		$M	0.00	0.00	13.13	13.13	13.13	13.13	13.13	13.13	13.13	7.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
(TOTAL INCOME NEEDED = 99.45)																												
ANNUAL ASSESSMENT RATE $/SQ. FT.				$0.00	$0.26	$0.26	$0.26	$0.26	$0.26	$0.26	$0.26	$0.15	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
TOTAL ASSESSMENTS PER SQ. FT.	$1.97																													
PRESENT WORTH AT 8%	$1.23																													

cell provided. The model calculates this discount as a percentage of the Additional Bonds Required. Most often, this percentage should be entered as zero in a planning study because bond buyer knowledge of these concerns will not exist until bonds are sold.

2.5 Cost of Issuance

The sale of a bond issue entails a set of expenses on the part of the Broker handling the bond sales for the agency. The user must enter the estimated cost of issuance percentage in the cell provided. The cost of issuance percentage generally ranges from one to two percent. The model calculates this cost as a percentage of the Additional Bonds Required.

2.6 Additional Bonds Required

Additional Bonds Required represents the bonds which must be sold to realize the required bond proceeds and to provide for the reserves fund deposit (if any), the discount from par (if any), and the costs of issuance. Additional Bonds Required are calculated by dividing the Proceeds Required from Bonds by 1 minus the sum of the Discount From Par and Cost of Issuance percentages. For each fiscal year, Additional Bonds Required must equal the sum of the four row entries immediately above its row.

2.7 Bond Amount

The entries in this column are transferred directly from the Additional Bonds Required row.

2.8 Fiscal Year

The entries in this column are calculated directly from the initial year entered in cell R8C8.

2.9 Duration

The duration of a bond issue is the number of years to maturity. It is also the equivalent number of annual debt service payments during the life of the issue. For this example, the final debt service payment is scheduled for 2000. If the first debt service payment is scheduled for 1993, the duration of the issue is 8 years. These data must be adjusted by the user as necessary.

2.10 Investment Rate

The investment rate is the interest earned on the sinking fund deposits to retire the bond principal. Generally, the investment rate (savings rate) is less than the dividend rate (loan rate). However, if the bonds mature serially, the investment rate is very close to the dividend rate. See Appendix A for further discussion.

2.11 Dividend Rate

The dividend rate is the interest rate paid to bond owners. Both the investment and dividend rates must be entered by the user. The rates may vary from year to year if the user has any rationale for such variation. One reason could be part of a sensitivity analysis which includes interest rates as a variable.

2.12 Debt Service Requirements Table

Each cell in the Debt Service Requirements Table contains a formula to calculate the debt service. An "If" statement consults the Bond Issue Exists Table which begins in Row 55. Entries in the Bond Issue Exists Table are 1 if a debt service payment could be due for the year in question and 0 otherwise. If the entry is 0, a dash is inserted in the corresponding cell of the Debt Service Requirements Table. If the entry is 1, then the debt service is calculated by the model.

2.13 Total

The Total is simply the sum of the seven possible bond amounts.

2.14 Debt Service

The Debt Service represents the annual debt service for all the bonds issued during the seven year period covered by the model. It is the sum, by column, of the seven rows in the Debt Service Requirements Table.

2.15 Coverage Ratio

The coverage ratio is calculated automatically by the model as the assessment income divided by debt service on the bonds issued. Coverage ratios are calculated interactively as the user enters appropriate assessment rate data.

2.16 Debt Service Reserve Fund

The Debt Service Reserve Fund is equivalent to the debt service payment scheduled for the subsequent fiscal year. The reserve fund earns interest credited at the end of the subsequent fiscal year. Any payment to the reserve fund is calculated as the difference between this year's balance and last year's balance in the reserve fund. (See Section 2.3 for additional information.)

2.17 Administrative Costs

The administrative costs of the Benefit Assessment District Program are estimated at $500,000 for the first year. This estimate was provided by District staff. They are expected to increase annually at the same rate as the Consumer Price Index or at about 4% per year. The user may adjust the inflation rate used as well as the administrative costs used in the analysis.

2.18 Total Obligations

Total obligations for a given year are the sum of debt service payments, administrative costs (if applicable), and the increase in the debt service reserve fund from a year earlier. The sum is automatically calculated by the model.

2.19 Revenue Anticipation Notes

The model provides for the use of Revenue Anticipation Notes (RANs) to cover shortfalls that will be overcome either with bonding or revenue in subsequent years. Generally, a lower interest rate is more normal for short term notes than for long term bonding (it may be as much as 2 points). However, this depends on market conditions at the time. The financial office at SCRTD can provide data on current borrowing rates.

2.20 Beginning Balance

The beginning balance is transferred from the prior fiscal year's ending balance. The user must enter the appropriate balance on hand for the initial year of the analysis based on the condition at that point in time.

2.21 Interest on the Reserve Fund

The Debt Service Reserve Fund earns interest at a long-term investment rate. The reserve fund balance at the end of the prior fiscal year is multiplied by the long-term interest rate which must be adjusted by the user. Sources of long-term rates include brokerage houses, "The Wall Street Journal," financial advisors, etc.

2.22 Interest on Balance

The cash on hand earns interest at a short-term investment rate. The interest earned in a given fiscal year is the average balance of the prior fiscal year multiplied by the short-term investment rate which must be adjusted by the user. Sources of short term rates include banks, brokerage houses, "The Wall Street Journal," etc.

2.23 Ending Balance

The ending balance is the cash on hand at the end of a given fiscal year. It is calculated by adding all income to the beginning balance and subtracting total obligations. All income consists of the interest earned on the debt service reserve and average balance plus the income expected from benefit assessments. The ending balance must be positive because of the coverage requirements.

2.24 Square Foot Schedule

The entries in this row are the estimates of assessable square feet on which assessments will be collected during the fiscal year. The user must enter a schedule corresponding to the assumptions of a given scenario. Several possible scenarios include no growth in assessable square feet, some intermediate growth rate, and a maximum growth rate for the station vicinities included in the portion of Metro Rail under examination. The number of square feet is entered in millions.

The schedule consists of an estimate of square feet of assessable space for each year of the analysis period. The user may enter a number for each year or may incorporate an annual percentage growth rate into the appropriate model cells.

2.25 Income Expectations

The expected income is calculated automatically by the model by multiplying the number of assessable square feet in millions by the annual assessment rate in dollars per square foot to yield income in millions of dollars.

2.26 Annual Assessment Rate

Annual assessment rates are entered by the user. The primary goal is to set the assessment rate to meet total obligations while maintaining the coverage ratio at some minimum value such as 1.10. The appropriate rate is suggested by bond counsel and will be included in the prospectus. The rate of 1.1 was suggested by District staff and is consistent with normal bonding procedures. The program runs interactively. When all the data relative to the bond issues and square foot schedules are entered, the user starts at the first year of assessment and enters assessment rates on a trial and error basis. When the coverage ratio is satisfactory, proceed to the next year and repeat the process. The assessment rate selected is the lowest rate which yields the required minimum coverage ratio.

In some instances while running the program, the user may notice fields of number signs (####). The field or cell width for numerical data is set at 5 with two decimals. As the user balances the cash flow to maintain a coverage ratio of at least 1.1 or so, these problems should clear up. If not, the cell widths should be increased to accommodate the larger numbers. However, note that cell widths of 5 are used to permit printing the program output on a single page. Thus, an alternative solution is to reduce decimals to 1 and leave the cell width at 5 spaces.

3.0 LONG-TERM BONDING PROGRAM WITH NO DEFERMENT

This bonding model would consist of a series of four bond issues to meet the construction demand schedule, with the first occurring in 1993 and the fourth in 1996. The assessment program would begin in 1992 with the first collections in December, 1992, and subsequent transfers to the RTD beginning in early 1993. The rate would gradually increase each of the first four years beginning at $0.07 per square foot in 1993. Much of the detail of the model is identical to that for the Mid-Range Financing Model. Thus, only lines which are different will be presented below. The user should refer to Figure 2 while reviewing the following text, and refer to Appendix A for additional discussion.

3.1 Debt Service Reserve Fund

The reserve fund payment is equivalent to one year's debt service for each bond issue. It is calculated by mutliplying the Additional Bonds Required by the Reserve Factor. (See Section 4.8 for the calculation of the Reserve Factor.)

3.2 Additional Bonds Required

Additional Bonds Required represents the bonds which must be sold to realize the required bond proceeds, to make the reserve fund deposit, and to pay the cost of issue fee. An expression for Bond Amount (BA) is given:

$$BA = BP + RFF * BA + ICF * BA$$

where: BP = Bond Proceeds
RFF = Reserve Fund Factor
ICF = Issue Cost Factor

The solution of this expression for the Bond Amount yields the following:

$$BA = \frac{BP}{I - ICF - RFF}$$

3.3 Duration

The Duration of a bond issue is the number of years to maturity. It is also the equivalent number of annual debt service payments during the life of the issue. For this example, the final debt service payment is scheduled for 2015. If the first debt service payment is scheduled for 1993, the duration of the issue is 23 years (2015-1993+1). these data must be adjusted by the user as necessary.

3.4 Total Obligations

For this model, Total Obligations are the sum of the debt service reserve fund and administrative costs.

FIGURE 2

LONG-TERM BONDING PROGRAM

NO DEFERMENT

BONDING MODULE

BENEFIT ASSESSMENT RATE CALCULATIONS
MOS-2 ONE/HALF MILE WALK

FISCAL YEARS			1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
PROCEEDS REQUIRED FROM BONDS		$M		0.0	20.0	20.0	15.0	20.0	0.0	0.0																				
DEBT SERVICE RESERVE FUND	1	$M		0.0	2.7	2.7	2.1	2.8	0.0	0.0																				
DISCOUNT FROM PAR	0.00%	$M		0.0	0.0	0.0	0.0	0.0	0.0	0.0																				
COST OF ISSUANCE	2.00%	$M		0.0	0.5	0.5	0.3	0.5	0.0	0.0																				
ADDITIONAL BONDS REQUIRED		$M		0.0	23.1	23.2	17.4	23.3	0.0	0.0																				

DEBT SERVICE REQUIREMENTS TABLE

DEFER INTER	BOND AMOUNT	FISCAL YEAR	DUR (N)	INVEST RATE(I)	DIVIDEND RATE(D)		1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
0	0.0	1992	25	8.0	10.0	$M	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-
0	23.1	1993	24	8.0	10.0	$M	-	-	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	-	-
0	23.2	1994	23	8.0	10.0	$M	-	-	-	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	-	-
0	17.4	1995	22	8.0	10.0	$M	-	-	-	-	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	-	-
0	23.3	1996	21	8.0	10.0	$M	-	-	-	-	-	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	-	-
0	0.0	1997	20	8.0	10.0	$M	-	-	-	-	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-
0	0.0	1998	19	8.0	10.0	$M	-	-	-	-	-	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-

TOTAL=86.934

			1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
DEBT SERVICE		$M	0.00	0.00	2.66	5.35	7.41	10.19	10.19	10.19	10.19	10.19	10.19	10.19	10.19	10.19	10.19	10.19	10.19	10.19	10.19	10.19	10.19	10.19	10.19	10.19	10.19	10.19	0.00	0.00
COVERAGE RATIO			N/A	N/A	1.14	1.10	1.12	1.12	1.11	1.13	1.10	1.11	1.12	1.13	1.14	1.10	1.10	1.10	1.14	1.13	1.12	1.10	1.13	1.11	1.13	1.10	0.96	-0.07	N/A	N/A
DEBT SERVICE RESERVE FUND		$M	0.00	0.00	2.66	5.35	7.41	10.19	10.19	10.19	10.19	10.19	10.19	10.19	10.19	10.19	10.19	10.19	10.19	10.19	10.19	10.19	10.19	10.19	10.19	10.19	10.19	10.19	0.00	0.00
ADMIN COSTS INFLATED BY	4.00% /YR	$M	0.00	0.00	0.50	0.52	0.54	0.56	0.58	0.61	0.63	0.66	0.68	0.71	0.74	0.77	0.80	0.83	0.87	0.90	0.94	0.97	1.01	1.05	1.10	1.14	1.18	1.23	0.00	0.00
TOTAL OBLIGATIONS		$M	0.00	0.00	3.16	5.87	7.95	10.76	10.78	10.80	10.83	10.85	10.88	10.91	10.94	10.96	11.00	11.03	11.06	11.10	11.13	11.17	11.21	11.25	11.29	11.33	11.38	1.23	0.00	0.00
BEGINNING BALANCE		$M	0.00	0.00	0.00	0.38	0.78	1.35	1.83	2.03	2.23	1.90	2.05	2.17	2.27	2.35	1.90	1.92	1.88	2.32	2.24	2.12	1.96	2.26	2.02	2.25	1.92	0.54	0.17	0.00
INTEREST ON RESERVE FUND	7.80%	$M	0.00	0.00	0.00	0.21	0.42	0.58	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.00	0.00
INTEREST ON BALANCE	5.50%	$M	0.00	0.00	0.00	0.01	0.03	0.06	0.09	0.11	0.12	0.11	0.11	0.12	0.12	0.13	0.12	0.10	0.10	0.12	0.13	0.12	0.11	0.12	0.12	0.12	0.11	0.07	0.02	0.00
ENDING BALANCE		$M	0.00	0.00	0.38	0.78	1.35	1.83	2.03	2.23	1.90	2.05	2.17	2.27	2.35	1.90	1.92	1.88	2.32	2.24	2.12	1.96	2.26	2.02	2.25	1.92	0.54	0.17	0.00	0.00
SQUARE FOOT SCHEDULE (M's) NO GROWTH			50.48	50.48	50.48	50.48	50.48	50.48	50.48	50.48	50.48	50.48	50.48	50.48	50.48	50.48	50.48	50.48	50.48	50.48	50.48	50.48	50.48	50.48	50.48	50.48	50.48	50.48	50.48	50.48
INCOME EXPECTATIONS		$M	0.00	0.00	3.53	6.06	8.08	10.60	10.10	10.10	9.59	10.10	10.10	10.10	10.10	9.59	10.10	10.10	10.60	10.10	10.10	10.10	10.60	10.10	10.60	10.10	9.09	0.00	0.00	0.00
(TOTAL INCOME NEEDED = 219.59)																														
ANNUAL ASSESSMENT RATE $/SQ. FT.				$0.00	$0.07	$0.12	$0.16	$0.21	$0.20	$0.20	$0.19	$0.20	$0.20	$0.20	$0.20	$0.19	$0.20	$0.20	$0.21	$0.20	$0.20	$0.20	$0.21	$0.20	$0.21	$0.20	$0.18	$0.00	$0.00	$0.00
TOTAL ASSESSMENTS PER SQ. FT.	$4.35																													
PRESENT WORTH AT 8%	$1.59																													

3.5 User Inputs

The user must provide certain data to use this model:

- The initial fiscal year. (See Section 3.1).
- The bond proceeds required by year (See Section 2.2).
- The discount from par should be entered as 0.0. (See Section 2.4).
- The cost of issuance should be changed from 2.0% if the user has better information. (See Section 2.5).
- The duration of each year's bond issue. (See Section 2.9).
- The investment rate or earnings rate on sinking fund deposits. (See Section 2.10).
- The dividend rate for borrowing funds from bond holders. (See Section 2.11).
- The coverage ratio is not entered by the user but is calculated by the model. However, the user must select the minimum value that must be maintained each year of the analysis period. (See Section 2.15).
- Administrative costs and the selected inflation rate. (See Section 2.17).
- The initial cash balance. (See Section 2.20)
- Interest rate on the debt reserve fund. (See Section 2.21)
- Interest rate on the cash balance. (See Section 2.22)
- The square foot schedule. (See Section 2.24)
- Annual assessment rate. The user enters assessment rates on a trial and error basis each year until the coverage ratio is near the selected minimum but not below. Assessment rates are specified to the nearest cent per square foot but this may be modified by the user.

3.6 Model Results

The principal results of the model are the annual assessment rates in cents per square foot that must be charged to service the bond issue debt in accordance with all the assumptions entered by the user. The user must gather the best information available to make best use of the model.

4.0 LONG-TERM BONDING PROGRAM WITH DEFERRED ASSESSMENT

This bonding model would consist of a series of four bond issues to meet the construction demand schedule, with the first occurring in 1993 and the fourth in 1996; however, the model allows the user to capitalize interest payments to bond owners for from 1 to 5 years. Principal payments are deferred for the same years in which interest is capitalized. At the end of the interest capitalization time period, full debt service payments must be paid from the income of the Phase II Benefit Assessment Program. Much of the detail of the model is identical to that for the previous bonding models. Thus, only lines which are different will be presented below. The user should refer to Figure 3 while reviewing the following text. Please refer to Appendix A for additional discussion.

4.1 Fiscal Years

The program allows for the issuance of bonds over a seven year period. While a 1992 to 1998 time frame is suggested in the model, the user may update the initial year of 1991. Interest may be capitalized (and principal deferred) for up to five years, but not beyond the seventh year of the bond issue period. For example, bonds issues in 1993 and 1994 may be capitalized for up to five (5) years while an issue sold in 1998 may be capitalized for only one year.

4.2 Debt Service Reserve Fund

In view of the capitalization of interest, the debt service reserve fund payment is financed through the sale of bonds. The reserve fund payment is equivalent to one year's debt service for each bond issue. It is calculated by multiplying the Additional Bonds Required by the Reserve Factor.

4.3 Additional Bonds Required

Additional Bonds Required represents the bonds which must be sold to realize the required bond proceeds, to make the reserve fund deposit and pay the cost of issue fee, and to make the interest payments to bond owners during the capitalization period. An expression for Bond Amount (BA) is given:

$$BA = BP + RFF * BA + ICF * BA + CAPF * BA$$

where:
- BP = Bond Proceeds
- RFF = Reserve Fund Factor
- ICF = Issue Cost Factor
- CAPF = Capitalization Factor

FIGURE 3

LONG-TERM BONDING PROGRAM
DEFERRED ASSESSMENT

BONDING MODULE

BENEFIT ASSESSMENT RATE CALCULATIONS
MOS-2 ONE/HALF MILE WALK

FISCAL YEARS			1992	1993	1994	1995	1996	1997	1998
PROCEEDS REQUIRED FROM BONDS		$M	0.0	20.0	20.0	15.0	20.0	0.0	0.0
DEBT SERVICE RESERVE FUND	1	$M	0.0	4.6	4.1	2.7	3.2	0.0	0.0
DISCOUNT FROM PAR	0.00%	$M	0.0	0.0	0.0	0.0	0.0	0.0	0.0
COST OF ISSUANCE	2.00%	$M	0.0	0.8	0.7	0.4	0.5	0.0	0.0
•ADDITIONAL BONDS REQUIRED		$M	0.0	38.0	33.3	22.1	26.1	0.0	0.0

DEBT SERVICE REQUIREMENTS TABLE

DEFER INTER	BOND AMOUNT	FISCAL YEAR	DUR (N)	INVEST RATE(I)	DIVIDEND RATE(D)		1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
5	0.0	1992	25	8.0	10.0	$M	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-
4	38.0	1993	24	8.0	10.0	$M	-	-	3.8	3.8	3.8	3.8	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	-	-
3	33.3	1994	23	8.0	10.0	$M	-	-	-	3.3	3.3	3.3	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	-	-
2	22.1	1995	22	8.0	10.0	$M	-	-	-	-	2.2	2.2	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	-	-
1	26.1	1996	21	8.0	10.0	$M	-	-	-	-	-	2.6	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	-	-
0	0.0	1997	20	8.0	10.0	$M	-	-	-	-	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-
0	0.0	1998	19	8.0	10.0	$M	-	-	-	-	-	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-

TOTAL=119.45

			1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
DEBT SERVICE		$M	0.00	0.00	0.00	0.00	0.00	0.00	14.56	14.56	14.56	14.56	14.56	14.56	14.56	14.56	14.56	14.56	14.56	14.56	14.56	14.56	14.56	14.56	14.56	14.56	14.56	14.56	0.00	0.00
COVERAGE RATIO			N/A	N/A	N/A	N/A	N/A	N/A	1.11	1.13	1.11	1.10	1.12	1.10	1.12	1.10	1.11	1.12	1.10	1.11	1.11	1.11	1.11	1.11	1.11	1.10	0.92	-0.07	N/A	N/A
DEBT SERVICE RESERVE FUND		$M	0.00	0.00	4.62	8.68	11.37	14.56	14.56	14.56	14.56	14.56	14.56	14.56	14.56	14.56	14.56	14.56	14.56	14.56	14.56	14.56	14.56	14.56	14.56	14.56	14.56	14.56	0.00	0.00
ADMIN COSTS INFLATED BY	4.00% /YR	$M	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.52	0.54	0.56	0.58	0.61	0.63	0.66	0.68	0.71	0.74	0.77	0.80	0.83	0.87	0.90	0.94	0.97	1.01	1.05	0.00	0.00
TOTAL OBLIGATIONS		$M	0.00	0.00	0.00	0.00	0.00	0.00	15.06	15.08	15.10	15.12	15.14	15.16	15.19	15.21	15.24	15.27	15.30	15.33	15.36	15.39	15.42	15.46	15.49	15.53	15.57	1.05	0.00	0.00
BEGINNING BALANCE		$M	0.00	0.00	0.00	0.00	0.36	1.05	1.97	2.78	3.10	2.93	2.74	3.03	2.79	3.03	2.74	2.93	3.09	2.72	2.83	2.89	2.93	2.94	2.91	2.85	2.75	0.08	0.24	0.00
INTEREST ON RESERVE FUND	7.80%	$M	0.00	0.00	0.00	0.36	0.68	0.89	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	0.00	0.00
INTEREST ON BALANCE	5.50%	$M	0.00	0.00	0.00	0.00	0.01	0.04	0.08	0.13	0.16	0.17	0.16	0.16	0.16	0.16	0.16	0.16	0.17	0.16	0.15	0.16	0.16	0.16	0.16	0.16	0.15	0.08	0.01	0.00
ENDING BALANCE		$M	0.00	0.00	0.00	0.36	1.05	1.97	2.78	3.10	2.93	2.74	3.03	2.79	3.03	2.74	2.93	3.09	2.72	2.83	2.89	2.93	2.94	2.91	2.85	2.75	0.08	0.24	0.00	0.00
SQUARE FOOT SCHEDULE (M's) NO GROWTH			50.48	50.48	50.48	50.48	50.48	50.48	50.48	50.48	50.48	50.48	50.48	50.48	50.48	50.48	50.48	50.48	50.48	50.48	50.48	50.48	50.48	50.48	50.48	50.48	50.48	50.48	50.48	50.48
INCOME EXPECTATIONS		$M	0.00	0.00	0.00	0.00	0.00	0.00	14.64	14.13	13.63	13.63	14.13	13.63	14.13	13.63	14.13	14.13	13.63	14.13	14.13	14.13	14.13	14.13	14.13	14.13	11.61	0.00	0.00	0.00
(TOTAL INCOME NEEDED = 264.01)																												
ANNUAL ASSESSMENT RATE $/SQ. FT.				$0.00	$0.00	$0.00	$0.00	$0.00	$0.29	$0.28	$0.27	$0.27	$0.28	$0.27	$0.28	$0.27	$0.28	$0.28	$0.27	$0.28	$0.28	$0.28	$0.28	$0.28	$0.28	$0.28	$0.23	$0.00	$0.00	$0.00
TOTAL ASSESSMENTS PER SQ. FT.	$5.23																													
PRESENT WORTH AT 8%	$1.67																													

The solution of this expression for the Bond Amount yields the following:

$$BA = \frac{BP}{1 - ICF - RFF - CAPF}$$

Expressions for these three bonding factors are given below.

4.4 Defer Interest

The user must enter the number of years during which interest payments are capitalized and principal payments are deferred. The maximum capitalization period is 5 years but cannot extend beyond 1998 for bonds issued in any one year (if 1993 is the starting year).

4.5 Debt Service Requirements Table

Each cell in the Debt Service Requirements Table contains a formula to calculate the debt service. An "If" statement consults the Bond Issue Exists Table which begins in Row 55. Entries in the Bond Issue Exists Table are 1 if a debt service payment could be due for the year in question and 0 otherwise. If the entry is 0, a dash is inserted in the corresponding cell of the Debt Service Requirements Table. If the entry is 1, then the debt service is calculated by the model.

A second "If" statement consults the Year of Life Table (Row 65) and compares the cell entry with the number of years of deferred principal. If the year of life is less than or equal to the years of deferred principal, the debt service is calculated as follows (interest only):

$$D.S. = BA * D$$

where: BA is the Bond Amount
D is the Dividend Rate

If the year of life is greater than the years of deferred principal, the debt service must include a principal payment as well as an interest payment. The debt service is calculated as follows:

$$DS = BA * D + BA * \frac{I}{(1 + I)\ (N - YDI) - 1}$$

where: I is the Investment rate,
N is the duration of the issue in years,
YDI is the number of years of deferred interest.

The interest payments from 1993 through 1996 as shown in the Debt Service Requirements Table of Figure 3 are paid to bond owners but not from benefit assessment income. Note that the entries are zero in the Debt Service row for 1993 through 1996. The interest payments are derived from the capitalization of interest portion of the bond amount. The interest payments during each year that interest is capitalized are calculated in the Capitalized Interest Table (Row 74).

4.6 Total Obligations

For this model, Total Obligations are the sum of debt service and administrative costs, if any. The debt service reserve fund payment is derived from the sale of bonds.

4.7 Annual Assessment Rate

Assessments are not made during the years in which interest is capitalized. An assessment rate of 0.0 is entered for each year that assessments will be deferred. In later years, the assessment is calculated on a trial and error basis to satisfy the minimum coverage ratio requirements. Assessment rates are calculated to the nearest cent per square foot.

4.8 Bond Factors Table

The Bond Factors Table includes the calculated value of the three bond factors used to calculate the Additional Bonds Required as outlined above. The bond factors are detailed:

1) Cost Factor. The magnitude of this factor is equal to 1 minus the sum of the discount from par and cost of issuance percentage rates.

2) Reserve Factor. This factor yields the annual debt service for a bond issue when multiplied by the bond amount. The factor is calculated:

$$RFF = DR + \frac{IR}{(1 + IR)^{(N-YDI)} - 1}$$

Where:	DR	= Dividend Rate
	IR	= Investment Rate
	N	= Life of the Bond Issue
	YDI	= Years of Deferred Interest

3) Capitalization Factor. This factor yields the funds needed to capitalize interest payments for a bond issue when multiplied by the bond amount. The factor is calculated by multiplying the annual interest paid for a bond issue of $1 by the present worth of a uniform series. The factor is calculated:

$$CAPF = DR * \frac{(1 + IR)^{YDI} - 1}{IR * (1 + IR)^{YDI}}$$

5.0 SUMMARY

Three bonding models are presented with appropriate documentation. The first model provides for maximum use of cash flow, short-term financing, and medium-term bonding to meet the construction financing needs of the project. The second model provides a phase-in of financing for the construction demands while taking advantage of long-term bonding. The third model allows the user to capitalize interest and defer principal payments until a future year when the project should either be under construction or completed.

All three models are interactive. The user inputs a wide variety of data considered representative and calculates the annual assessment rates necessary to support the program. Conversely, it is possible to set the assessment rates and determine the bond proceeds that may be raised. This can be done in the context of sensitivity analyses.

LODESTAR User's Manual Technical Memorandum 88.5.2, may be consulted for information on the use of MULTIPLAN spreadsheets.

APPENDIX A: NOTES ON BOND ISSUES

Capital construction projects require that most of the payments for construction costs be made during or soon after construction, before the project begins generating operating revenues. In that respect, fund flow patterns for capital construction projects are entirely different than for operating expenses, which tend to occur evenly across the life of the project. Tax receipts are generally received evenly over time. Therefore, tax collections are a good way to meet operating expenses, but a poor way to finance capital construction.

Los Angeles County collects a 1/2 percent sales tax known as Proposition A. Of net Proposition A receipts, 35% is set aside for capital funding of Los Angeles County rail transit systems. LACTC policy is to use these funds for direct cash payments for construction or as debt service on bond issues. The proceeds of the bond issues are to help finance transit construction in the early, capital-intensive years of scheduled development.

A.1 AGENCY BONDS

Some public projects are financed with current tax revenues, but most capital projects are financed with long-term debt. Debt financing allows projects to be completed more quickly than would be possible by relying solely on tax receipts. Tax-exempt bonds are the source of virtually all long-term debt for government-financed projects. Interest paid to bond holders is exempt from Federal tax, and often from state and local tax as well. However, Federal government regulations on tax-exempt bonds are revised often and should be monitored by Bond Counsel for any impact on agency bonds.

A bond is simply a promise to pay interest periodically at a fixed rate, and to pay the principal at some given date. There are two types of municipal bonds. "General obligation" bonds are secured by the full faith and credit (including taxation) of the government unit or agency which issues the bonds. "Revenue" bonds are secured by revenues generated by the completed project (e.g., toll roads, water treatment plants, etc.).

General obligation bonds, which are secured by the state taxing power, generally have higher credit ratings and lower interest rates than revenue bonds. As agency obligations for debt service increase, however, interest rates on subsequent issues tend to increase.

There are several restrictions on public borrowing:

1. Total borrowing power is limited to some function of the tax base from which revenues are derived.

2. In general, bonds are issued for specific purposes and only with the approval of the voters in the affected tax district. Often, approval of specific projects includes approval of a new tax, or the rededication of an existing tax to finance the project. Revenue bonds require user rates sufficient to operate the system and meet debt service payments.

3. Repayment of the debt must occur over a specified number of years and must follow a plan. The plan generally provides that the bonds mature serially.

A.2 BOND CHARACTERISTICS

Most tax-exempt bonds are issued with a face or par value of $1,000 or $5,000, which is the principal. The number of bonds in the total issue is, therefore, some integer number of $1000 bonds.

"Bond maturity" is the time span in years over which the bonded debt must be retired. For tax-exempt bonds, maturities range from 20 to 30 years.

Interest is paid on outstanding bonds to bond holders. Usually, interest rates are not the same for all bonds in an issue. Bond interest rates are also referred to as "coupon rates" or "dividend rates."

The issuing agency must provide for two components of debt service on an annual basis: 1. Interest paid to bond holders; and, 2. "Sinking fund" payments which earn interest at an "investment rate." Sinking fund payments provide the funds necessary to pay the principal of the bond issue by the stipulated date. The investment rate is a factor in determining the annual sinking fund payment.

During construction, sinking fund payments may be deferred, although interest payments are made. This arrangement is called "deferral of principal." Interest payments required during the first two or three years of project construction may be capitalized by enlarging the bond issue to generate funds to pay the interest. This arrangement is called "capitalization of interest." In general, principal payments are deferred over the same time period that interest is capitalized.

The "coverage ratio" is a device used to ensure the availability of sufficient funds for debt service. All revenues accruing to an agency, less all operating expenses, constitute the funds available for debt service. The coverage ratio is calculated by dividing the funds available for debt service by the expected debt service. The coverage ratio must equal or exceed some minimum value. In some cases, a reserve fund of a specified size must be maintained from year to year.

"Issue expenses" are the costs of issuing bonds. There are initial or fixed costs and annual costs of issuing bonds. Initial costs include printing the bonds, preparing the registration statement for the Securities and Exchange Commission, accounting and legal expenses, and broker fees. Annual expenses include trustee fees and the costs incurred in servicing the debt.

Thus, the true cost of borrowing is somewhat greater than the interest rate paid to the bond owners. The selling price of the bonds less the issue expenses yield the net proceeds of the issue, which are the funds available for capital expenditures. The true cost of borrowing may be determined by relating the net proceeds to the debt service cash flow and solving for the interest rate.

A.3 REPAYMENT OF THE BOND ISSUE

Interest payments are made annually. The principal is repaid in a lump sum on the date specified by the bond issue. Lump sum repayments are secured by annual payments to a sinking fund. Often sinking fund payments are required by statute.

If the diversion of sinking-fund monies to other uses is of concern, a statute may require serial maturities of the bond issue. For example, a 20-year bond issue may consist of 2,000 bonds at $1,000 each. Serial maturity may require that 100 bonds reach maturity at the end of each of the 20 years and, hence, require debt service for capital of $100,000 per year. If the bond interest rate is 10%, debt service for interest declines uniformly from $200,000 for the first year to $10,000 for the last year of the issue. Total debt service declines from $300,000 the first year to $100,000 the last year.

Usually, it is desirable to keep annual debt service costs uniform. This uniformity can be achieved by scheduling serial maturities in accordance with available funds. In the example above, a uniform annual debt service payment is calculated by multiplying the size of the bond issue by the capital recovery factor:

Debt Service = $2,000,000 * CRF (10%; 20 years)

= $234,920.00 per year.

At the end of the first year, an interest payment of $200,000 is made and 34 bonds mature. The remaining $920 is invested and available for bond retirement at the end of the second year. Due to early bond maturities, annual interest costs decrease each year, while the number of bonds maturing increases.

For some issues, bonds do not mature serially for a few years. For other issues, a percentage of the bonds mature serially, but the remainder go full term.

Sinking funds are established by a somewhat different method. Annual sinking fund payments are calculated by multiplying the size of the bond issue by the sinking fund factor, using the investment rate rather than the bond interest rate:

Sinking Fund = $2,000,000 * SFF (6%; 20 years)

= $54,370

The use of sinking-fund deposits for serially maturing bonds is equivalent to buying one's own bonds for investment purposes. For example, if sinking-fund deposits yield 6% interest, and bonds yield 10% interest, buying back bonds yields an additional 4% interest. Thus, an agency using serial maturities could calculate its annual debt service by the capital recovery factor at the bond interest rate. However, using standard sinking fund deposits is the more conservative approach.

Investors, of course, are aware of the potential advantage in bond buy-backs. If it is advantageous for the agency to invest in its own bonds, it is advantageous for the investor to hold them. Thus, bonds which are bought back, or "called" by the issuing agency command a premium, either a higher price than par value or a higher bond interest rate on early maturing bonds.

A.4 INVESTORS IN TAX-EXEMPT BONDS

The tax-exempt bond market is complex and diverse. A single issue may have a number of different maturities within it, perhaps as many as 30, and 10 or so different bond interest rates, a consequence of serial maturation.

Tax-exempt bonds typically yield interest rates of about 65 to 75% of corporate bond rates. At these comparatively low yields, tax-exempt bonds are primarily attractive to investors who are in high tax brackets. Tax-exempt institutional investors have little or no interest in tax-exempt bonds. The major purchasers of tax-exempt bonds are commercial banks, high-income households, and casualty insurance companies. Legislation under discussion in Congress may have significant impact on the tax-exempt bond market.