



# Municipal Bond Basics

**Presented by: Lee Davidow**

**March 26, 2026**

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PFM

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# Agenda

## **I. New Money Transactions**

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- Elements of Size
- Debt Service Structure
- Bond Structure
- Yield(s)

## **II. Why Arbitrage Yield Matters – IRS Regulations**

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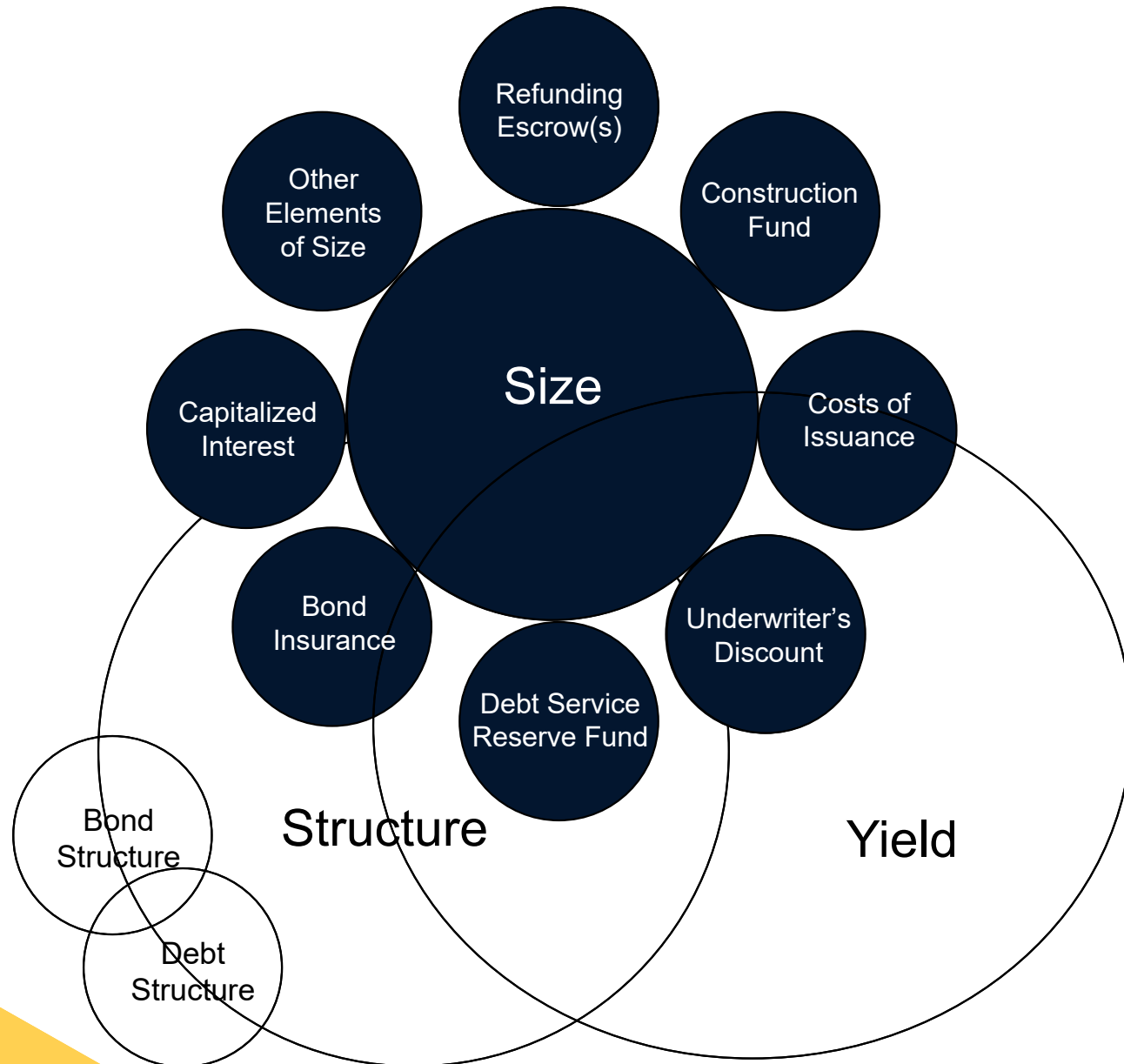
- IRS Regulations
- Arbitrage Yield & Yield Restrictions
- Exceptions to Arbitrage Rebate
- Funds Subject to Rebate



# New Money Transactions



## Tao of Municipal Modeling — Elements of Size





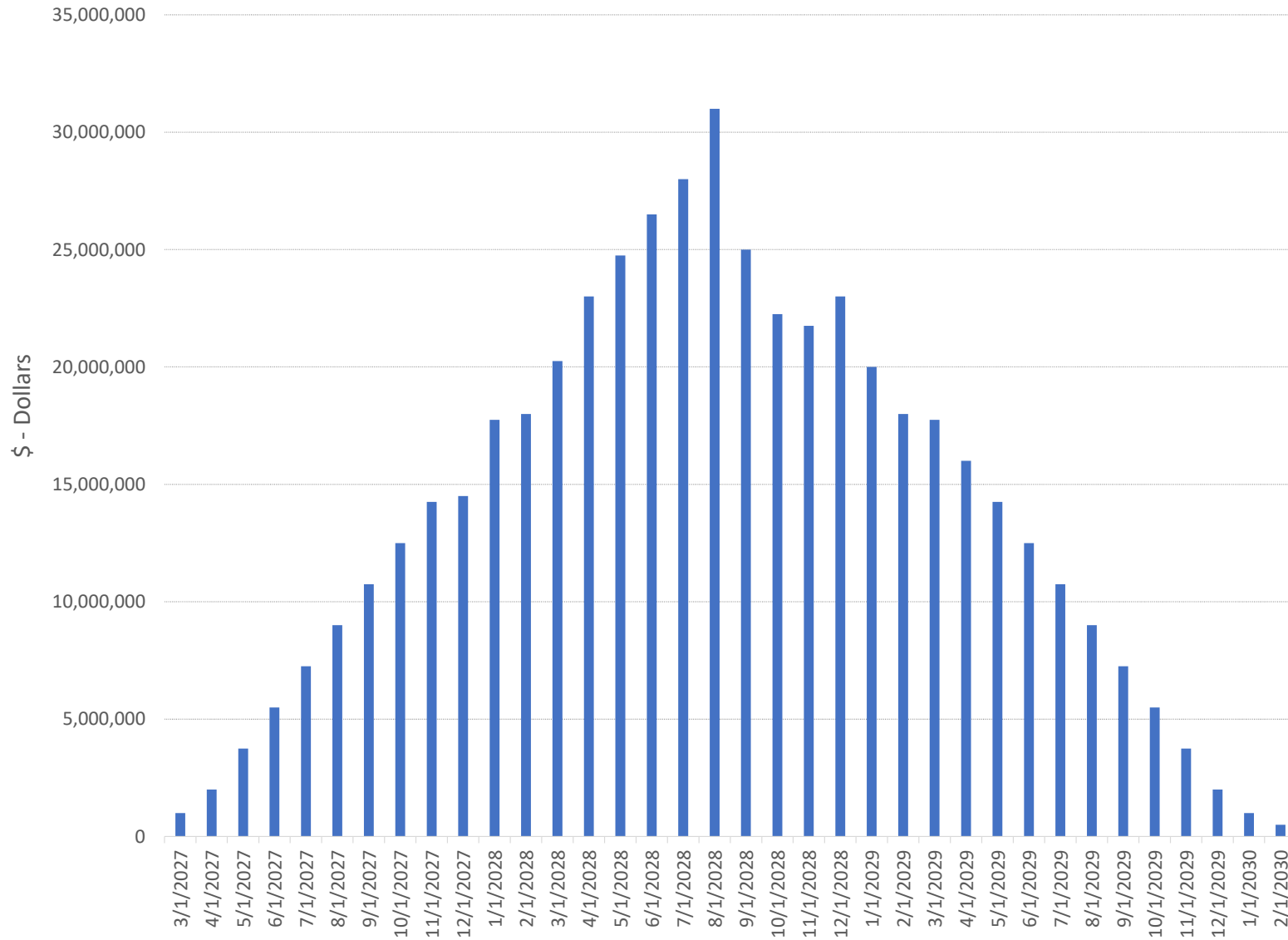
## Sizing

A government needs to build a new bridge. The estimated completion is three years, and total project costs total \$500 million. Construction for the project begins March 1, 2027, and it will take 3 years for the project to become fully operational. As such, revenues securing the debt service (i.e., bridge tolls) will become available to pay debt service on the bonds on March 1, 2030.





# Construction Fund Draw Schedule





# Construction Fund Schedule – Gross Funded

Gross funded

Interest earnings not needed to fund scheduled draws

Date	Deposit	Interest @ 3%	Principal	Scheduled Draws	Balance
03/01/2027	500,000,000	-		-	500,000,000
03/15/2027		583,333.33	1,000,000	1,000,000	499,000,000
04/15/2027	-	1,247,500.00	2,000,000	2,000,000	497,000,000
05/15/2027	-	1,242,500.00	3,750,000	3,750,000	493,250,000
06/15/2027	-	1,233,125.00	5,500,000	5,500,000	487,750,000
07/15/2027	-	1,219,375.00	7,250,000	7,250,000	480,500,000
08/15/2027	-	1,201,250.00	9,000,000	9,000,000	471,500,000
09/15/2027	-	1,178,750.00	10,750,000	10,750,000	460,750,000
10/15/2027	-	1,151,875.00	12,500,000	12,500,000	448,250,000
11/15/2027	-	1,120,625.00	14,250,000	14,250,000	434,000,000
12/15/2027	-	1,085,000.00	14,500,000	14,500,000	419,500,000
01/15/2028	-	1,048,750.00	17,750,000	17,750,000	401,750,000
02/15/2028	-	1,004,375.00	18,000,000	18,000,000	383,750,000
03/15/2028	-	959,375.00	20,250,000	20,250,000	363,500,000
04/15/2028	-	908,750.00	23,000,000	23,000,000	340,500,000
05/15/2028	-	851,250.00	24,750,000	24,750,000	315,750,000
06/15/2028	-	789,375.00	26,500,000	26,500,000	289,250,000
07/15/2028	-	723,125.00	28,000,000	28,000,000	261,250,000
08/15/2028	-	653,125.00	31,000,000	31,000,000	230,250,000
09/15/2028	-	575,625.00	25,000,000	25,000,000	205,250,000
10/15/2028	-	513,125.00	22,250,000	22,250,000	183,000,000
11/15/2028	-	457,500.00	21,750,000	21,750,000	161,250,000
12/15/2028	-	403,125.00	23,000,000	23,000,000	138,250,000
01/15/2029	-	345,625.00	20,000,000	20,000,000	118,250,000
02/15/2029	-	295,625.00	18,000,000	18,000,000	100,250,000
03/15/2029	-	250,625.00	17,750,000	17,750,000	82,500,000
04/15/2029	-	206,250.00	16,000,000	16,000,000	66,500,000
05/15/2029	-	166,250.00	14,250,000	14,250,000	52,250,000
06/15/2029	-	130,625.00	12,500,000	12,500,000	39,750,000
07/15/2029	-	99,375.00	10,750,000	10,750,000	29,000,000
08/15/2029	-	72,500.00	9,000,000	9,000,000	20,000,000
09/15/2029	-	50,000.00	7,250,000	7,250,000	12,750,000
10/15/2029	-	31,875.00	5,500,000	5,500,000	7,250,000
11/15/2029	-	18,125.00	3,750,000	3,750,000	3,500,000
12/15/2029	-	8,750.00	2,000,000	2,000,000	1,500,000
01/15/2030	-	3,750.00	1,000,000	1,000,000	500,000
02/15/2030	-	1,250.00	500,000	500,000	-
	500,000,000	21,831,458.33	500,000,000	500,000,000	





# Construction Fund Schedule – Net Funded

<b>Net funded</b>	<b>Date</b>	<b>Deposit</b>	<b>Interest @ 3%</b>	<b>Principal</b>	<b>Scheduled Draws</b>	<b>Balance</b>
	03/01/2027	478,739,963.84	-	-	-	478,739,963.84
	03/15/2027	-	558,529.96	441,470.04	1,000,000	478,298,493.80
	04/15/2027	-	1,195,746.23	804,253.77	2,000,000	477,494,240.03
	05/15/2027	-	1,193,735.60	2,556,264.40	3,750,000	474,937,975.63
	06/15/2027	-	1,187,344.94	4,312,655.06	5,500,000	470,625,320.57
	07/15/2027	-	1,176,563.30	6,073,436.70	7,250,000	464,551,883.87
	08/15/2027	-	1,161,379.71	7,838,620.29	9,000,000	456,713,263.58
	09/15/2027	-	1,141,783.16	9,608,216.84	10,750,000	447,105,046.74
	10/15/2027	-	1,117,762.62	11,382,237.38	12,500,000	435,722,809.36
	11/15/2027	-	1,089,307.02	13,160,692.98	14,250,000	422,562,116.38
	12/15/2027	-	1,056,405.29	15,043,594.71	14,500,000	409,118,521.67
	01/15/2028	-	1,022,796.30	16,927,203.70	17,750,000	392,391,317.97
	02/15/2028	-	980,978.29	18,811,021.71	18,000,000	375,372,296.26
	03/15/2028	-	938,430.74	20,705,569.26	20,250,000	356,060,727.00
	04/15/2028	-	890,151.82	22,610,848.18	23,000,000	333,950,878.82
	05/15/2028	-	834,877.20	24,527,915.80	24,750,000	310,035,756.02
	06/15/2028	-	775,089.39	26,456,910.61	26,500,000	284,310,845.41
	07/15/2028	-	710,777.11	28,398,222.89	28,000,000	257,021,622.52
	08/15/2028	-	642,554.06	30,352,445.94	31,000,000	226,664,176.58
	09/15/2028	-	566,660.44	32,423,339.56	25,000,000	202,230,837.02
	10/15/2028	-	505,577.09	34,604,422.91	22,250,000	180,486,414.11
	11/15/2028	-	451,216.04	36,898,783.96	21,750,000	159,187,630.15
	12/15/2028	-	397,969.08	39,302,030.92	23,000,000	136,585,599.23
	01/15/2029	-	341,464.00	41,818,536.00	20,000,000	116,927,063.23
	02/15/2029	-	292,317.66	44,443,682.34	18,000,000	99,219,380.89
	03/15/2029	-	248,048.45	47,179,951.55	17,750,000	81,717,429.34
	04/15/2029	-	204,293.57	50,021,706.43	16,000,000	65,921,722.91
	05/15/2029	-	164,804.31	52,975,195.69	14,250,000	51,836,527.22
	06/15/2029	-	129,591.32	56,037,408.68	12,500,000	39,466,118.54
	07/15/2029	-	98,665.30	59,304,334.70	10,750,000	28,814,783.84
	08/15/2029	-	72,036.96	62,772,963.04	9,000,000	19,886,820.80
	09/15/2029	-	49,717.05	66,441,282.95	7,250,000	12,686,537.85
	10/15/2029	-	31,716.34	70,306,283.66	5,500,000	7,218,254.19
	11/15/2029	-	18,045.64	74,365,954.36	3,750,000	3,486,299.83
	12/15/2029	-	8,715.75	78,616,284.25	2,000,000	1,495,015.58
	01/15/2030	-	3,737.54	83,053,262.46	1,000,000	498,753.12
	02/15/2030	-	1,246.88	87,686,512.12	500,000	-
		478,739,963.84	21,260,036.16	478,739,963.84	500,000,000	

Interest earnings + draws on principal fund scheduled draws



## Construction Fund (cont'd)

### *Sources:*

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Bond Proceeds:	
Par Amount	478,740,000.00
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	478,740,000.00
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### *Uses:*

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Project Fund Deposits:		
Project Fund	478,739,963.84	←
Other Uses of Funds:		
Rounding	36.16	} <i>Required, as bonds are sold in denominations of \$5,000 (a.k.a. "Rounding")</i>
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	478,740,000.00	
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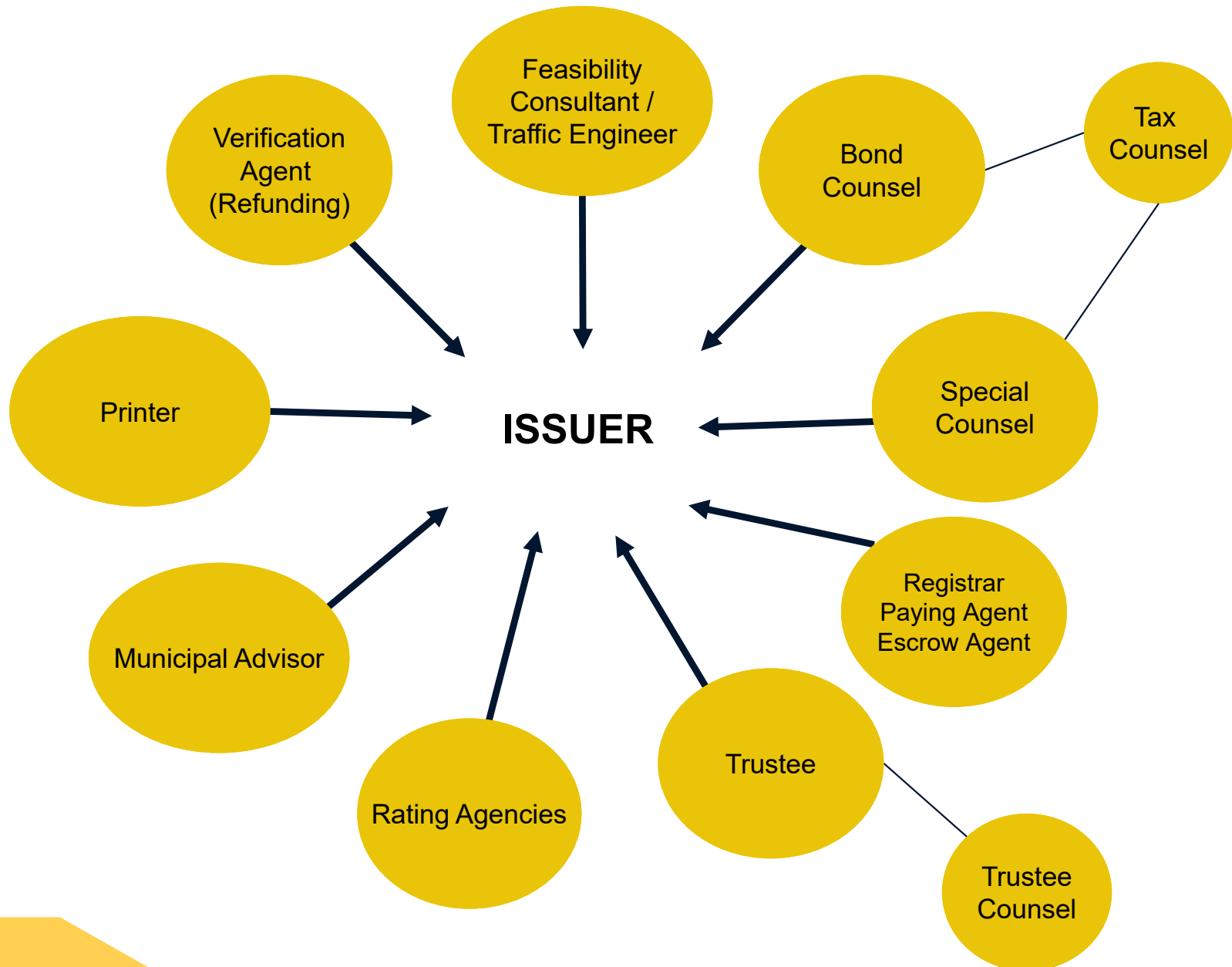
## Poll question 1

Which of the following would result in a greater amount of par issued?

- A. A net-funded project
- B. A gross-funded project



## Cost of Issuance





## Cost of Issuance (cont'd)

<i>Cost of Issuance</i>	<i>\$/1000</i>	<i>Amount</i>
Bond Counsel	0.20876	100,000.00
Tax Counsel	0.03131	15,000.00
Special Counsel	0.02088	10,000.00
Trustee	0.00626	3,000.00
Trustee Counsel	0.00418	2,000.00
Standard & Poor's	0.04175	20,000.00
Fitch	0.04175	20,000.00
Moody's	0.04175	20,000.00
Financial Advisor	0.15657	75,000.00
Printer	0.01044	5,000.00
Miscellaneous	0.03131	15,000.00
	0.59496	285,000.00



## Cost of Issuance (cont'd)

### *Sources:*

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Bond Proceeds:	
Par Amount	479,025,000.00

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↑ up from \$478,740,000

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479,025,000.00

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### *Uses:*

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Project Fund Deposits:	
Project Fund	478,739,963.84
Delivery Date Expenses:	
Cost of Issuance	285,000.00
Other Uses of Funds:	
Rounding	36.16

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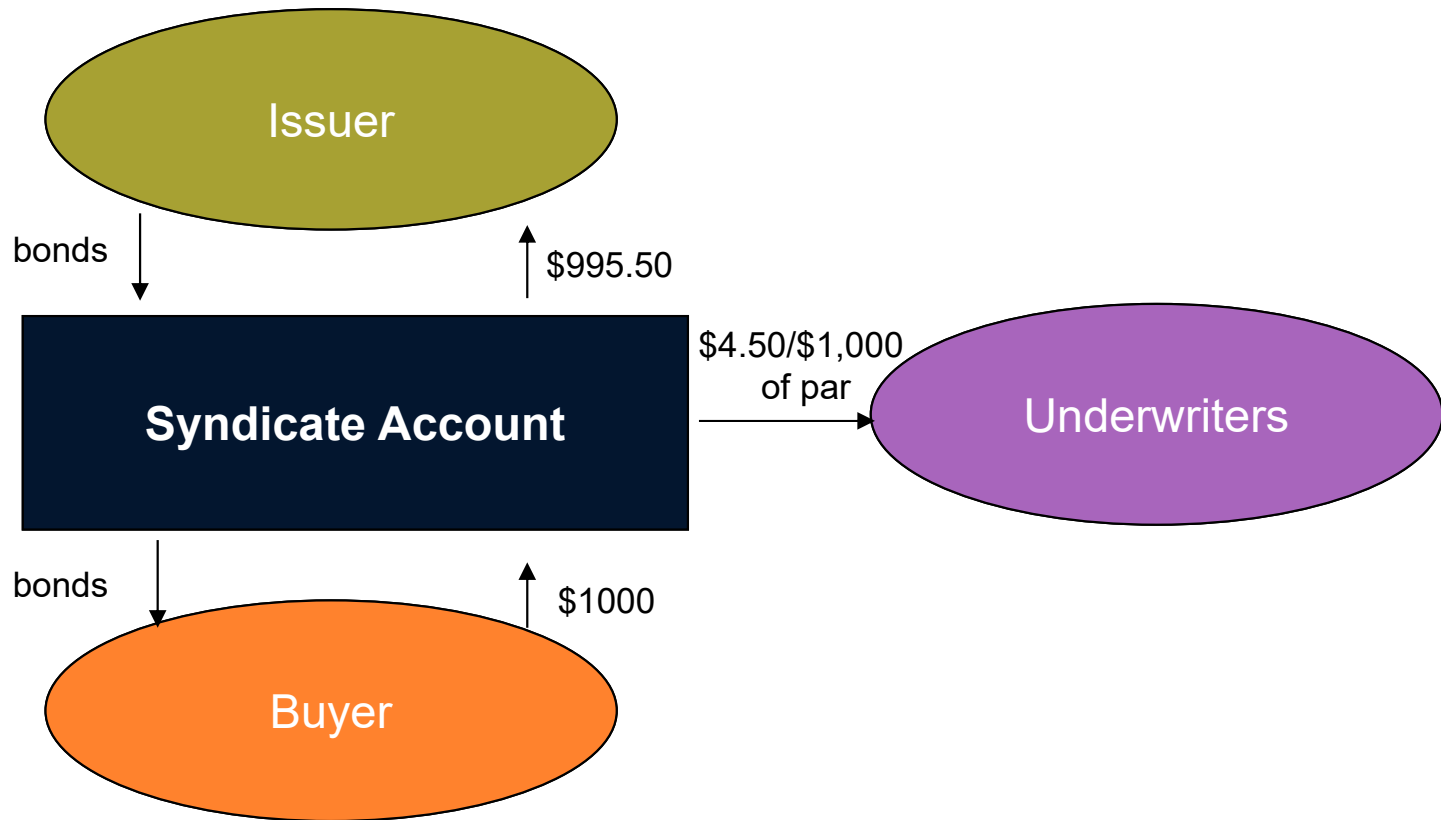
479,025,000.00

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## Underwriter's Discount



<u>Component</u>	<u>"Old" Days</u>	<u>Today</u>
Management Fee	\$5.00	\$0.00
Takedown	20.00	3.00
Risk	1.00	0.00
Expenses	<u>4.00</u>	<u>1.50</u>
	\$30.00	\$4.50



## Underwriter's Discount (cont'd)


<i>Underwriter's Discount</i>	<i>\$/1000</i>	<i>Amount</i>
Average Takedown	3.00000	1,441,725.00
Underwriter's Counsel	0.11445	55,000.00
MSRB	0.00104	500.00
CUSIP	0.00062	300.00
Dalcomp	0.03000	14,417.25
SIFMA	0.03000	14,417.25
Day Loan	0.02700	12,975.53
Miscellaneous	0.02081	10,000.00
	3.22392	1,549,335.03






## Underwriter's Discount (cont'd)

### Sources:

Bond Proceeds:		
Par Amount	480,575,000.00	 up from \$479,025,000
	<hr/>	
	480,575,000.00	
	<hr/> <hr/>	

### Uses:

Project Fund Deposits:		
Project Fund	478,739,963.84	
Delivery Date Expenses:		
Cost of Issuance	285,000.00	
Underwriter's Discount	1,549,335.03	
	<hr/>	
	1,834,335.03	
Other Uses of Funds:		
Rounding	701.13	
	<hr/>	
	480,575,000.00	
	<hr/> <hr/>	



## Poll question 2

In the current market for a typical bond issuance, what items comprise the Underwriter's Discount?

- A. Risk
- B. Takedown
- C. Expenses
- D. Management Fee
- E. B and C only
- F. B, C and D only
- G. All of the above



## Debt Service Reserve Fund

- ◆ Security for investors in case the issuer is unable to meet debt service obligations
- ◆ Provides short-term liquidity
- ◆ Interest generated from DSRF can be used to subsidize other funds (i.e., reduce initial deposit size in project fund) or pay debt service costs
- ◆ Sized to meet investor needs, subject to IRS constraints
  - Reasonably Required Reserve and Replacement Fund (4-R)
  - Lesser of:
    - 10% of Par
    - 1.25X Average Annual Debt Service
    - Maximum Annual Debt Service (“MADS”)

More information on IRS constraints can be found [here](#).



# Debt Service Reserve Fund – Formula Verification

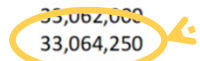
## Annual Debt Service

Period Ending	Principal	Coupon	Interest	Debt Service
12/31/2027	-	-	12,843,625	12,843,625
12/31/2028	7,565,000	5.000%	25,498,125	33,063,125
12/31/2029	7,950,000	5.000%	25,110,250	33,060,250
12/31/2030	8,360,000	5.000%	24,702,500	33,062,500
12/31/2031	8,790,000	5.000%	24,273,750	33,063,750
12/31/2032	9,240,000	5.000%	23,823,000	33,063,000
12/31/2033	9,715,000	5.000%	23,349,125	33,064,125
12/31/2034	10,210,000	5.000%	22,851,000	33,061,000
12/31/2035	10,735,000	5.000%	22,327,375	33,062,375
12/31/2036	11,285,000	5.000%	21,776,875	33,061,875
12/31/2037	11,865,000	5.000%	21,198,125	33,063,125
12/31/2038	12,470,000	5.000%	20,589,750	33,059,750
12/31/2039	13,110,000	5.000%	19,950,250	33,060,250
12/31/2040	13,785,000	5.000%	19,277,875	33,062,875
12/31/2041	14,490,000	5.000%	18,571,000	33,061,000
12/31/2042	15,235,000	5.000%	17,827,875	33,062,875
12/31/2043	16,015,000	5.000%	17,046,625	33,061,625
12/31/2044	16,835,000	5.000%	16,225,375	33,060,375
12/31/2045	17,700,000	5.000%	15,362,000	33,062,000
12/31/2046	18,610,000	5.000%	14,454,250	33,064,250
12/31/2047	19,560,000	5.000%	13,500,000	33,060,000
12/31/2048	20,565,000	5.000%	12,496,875	33,061,875
12/31/2049	21,620,000	5.000%	11,442,250	33,062,250
12/31/2050	22,730,000	5.000%	10,333,500	33,063,500
12/31/2051	23,895,000	5.000%	9,167,875	33,062,875
12/31/2052	25,120,000	5.000%	7,942,500	33,062,500
12/31/2053	26,410,000	5.000%	6,654,250	33,064,250
12/31/2054	27,760,000	5.000%	5,300,000	33,060,000
12/31/2055	29,185,000	5.000%	3,876,375	33,061,375
12/31/2056	30,680,000	5.000%	2,379,750	33,059,750
12/31/2057	32,255,000	5.000%	806,375	33,061,375
	513,745,000		490,958,500	1,004,703,500

**Reserve Requirement = MADS**

## Formula Verification

Component	Formula	Value
DSRF	Maximum annual Debt Service	33,064,250.00
DSRF	125% of average annual Debt Service	41,862,645.83
DSRF	10% of Par Amount	51,374,500.00
DSRF	Debt Service Reserve Fund	33,064,250.00



For illustrative purposes only



# Debt Service Reserve Fund Earnings

DSRF interest earnings used to offset debt service payments

Why not Net Fund?

Date	Deposit	Interest @ 4.5%	Principal	Debt Service	Balance
12/31/2027	33,064,250	743,945.63	-	(743,945.63)	33,064,250
12/31/2028	-	1,487,891.26	-	(1,487,891.26)	33,064,250
12/31/2029	-	1,487,891.26	-	(1,487,891.26)	33,064,250
12/31/2030	-	1,487,891.26	-	(1,487,891.26)	33,064,250
12/31/2031	-	1,487,891.26	-	(1,487,891.26)	33,064,250
12/31/2032	-	1,487,891.26	-	(1,487,891.26)	33,064,250
12/31/2033	-	1,487,891.26	-	(1,487,891.26)	33,064,250
12/31/2034	-	1,487,891.26	-	(1,487,891.26)	33,064,250
12/31/2035	-	1,487,891.26	-	(1,487,891.26)	33,064,250
12/31/2036	-	1,487,891.26	-	(1,487,891.26)	33,064,250
12/31/2037	-	1,487,891.26	-	(1,487,891.26)	33,064,250
12/31/2038	-	1,487,891.26	-	(1,487,891.26)	33,064,250
12/31/2039	-	1,487,891.26	-	(1,487,891.26)	33,064,250
12/31/2040	-	1,487,891.26	-	(1,487,891.26)	33,064,250
12/31/2041	-	1,487,891.26	-	(1,487,891.26)	33,064,250
12/31/2042	-	1,487,891.26	-	(1,487,891.26)	33,064,250
12/31/2043	-	1,487,891.26	-	(1,487,891.26)	33,064,250
12/31/2044	-	1,487,891.26	-	(1,487,891.26)	33,064,250
12/31/2045	-	1,487,891.26	-	(1,487,891.26)	33,064,250
12/31/2046	-	1,487,891.26	-	(1,487,891.26)	33,064,250
12/31/2047	-	1,487,891.26	-	(1,487,891.26)	33,064,250
12/31/2048	-	1,487,891.26	-	(1,487,891.26)	33,064,250
12/31/2049	-	1,487,891.26	-	(1,487,891.26)	33,064,250
12/31/2050	-	1,487,891.26	-	(1,487,891.26)	33,064,250
12/31/2051	-	1,487,891.26	-	(1,487,891.26)	33,064,250
12/31/2052	-	1,487,891.26	-	(1,487,891.26)	33,064,250
12/31/2053	-	1,487,891.26	-	(1,487,891.26)	33,064,250
12/31/2054	-	1,487,891.26	-	(1,487,891.26)	33,064,250
12/31/2055	-	1,487,891.26	-	(1,487,891.26)	33,064,250
12/31/2056	-	1,487,891.26	-	(1,487,891.26)	33,064,250
12/31/2057	-	743,945.63	33,064,250	(33,808,195.63)	-
	33,064,250	44,636,737.80	33,064,250	(77,700,987.80)	





## Debt Service Reserve Fund – Net Debt Service


DSRF interest earnings

<i>Period Ending</i>	<i>Principal</i>	<i>Interest</i>	<i>Total Debt Service</i>	<i>Debt Service Reserve Fund</i>	<i>Net Debt Service</i>
12/31/2027	-	12,843,625	12,843,625	743,945.63	12,099,679.37
12/31/2028	7,565,000	25,498,125	33,063,125	1,487,891.26	31,575,233.74
12/31/2029	7,950,000	25,110,250	33,060,250	1,487,891.26	31,572,358.74
12/31/2030	8,360,000	24,702,500	33,062,500	1,487,891.26	31,574,608.74
12/31/2031	8,790,000	24,273,750	33,063,750	1,487,891.26	31,575,858.74
12/31/2032	9,240,000	23,823,000	33,063,000	1,487,891.26	31,575,108.74
12/31/2033	9,715,000	23,349,125	33,064,125	1,487,891.26	31,576,233.74
12/31/2034	10,210,000	22,851,000	33,061,000	1,487,891.26	31,573,108.74
12/31/2035	10,735,000	22,327,375	33,062,375	1,487,891.26	31,574,483.74
12/31/2036	11,285,000	21,776,875	33,061,875	1,487,891.26	31,573,983.74
12/31/2037	11,865,000	21,198,125	33,063,125	1,487,891.26	31,575,233.74
12/31/2038	12,470,000	20,589,750	33,059,750	1,487,891.26	31,571,858.74
12/31/2039	13,110,000	19,950,250	33,060,250	1,487,891.26	31,572,358.74
12/31/2040	13,785,000	19,277,875	33,062,875	1,487,891.26	31,574,983.74
12/31/2041	14,490,000	18,571,000	33,061,000	1,487,891.26	31,573,108.74
12/31/2042	15,235,000	17,827,875	33,062,875	1,487,891.26	31,574,983.74
12/31/2043	16,015,000	17,046,625	33,061,625	1,487,891.26	31,573,733.74
12/31/2044	16,835,000	16,225,375	33,060,375	1,487,891.26	31,572,483.74
12/31/2045	17,700,000	15,362,000	33,062,000	1,487,891.26	31,574,108.74
12/31/2046	18,610,000	14,454,250	33,064,250	1,487,891.26	31,576,358.74
12/31/2047	19,560,000	13,500,000	33,060,000	1,487,891.26	31,572,108.74
12/31/2048	20,565,000	12,496,875	33,061,875	1,487,891.26	31,573,983.74
12/31/2049	21,620,000	11,442,250	33,062,250	1,487,891.26	31,574,358.74
12/31/2050	22,730,000	10,333,500	33,063,500	1,487,891.26	31,575,608.74
12/31/2051	23,895,000	9,167,875	33,062,875	1,487,891.26	31,574,983.74
12/31/2052	25,120,000	7,942,500	33,062,500	1,487,891.26	31,574,608.74
12/31/2053	26,410,000	6,654,250	33,064,250	1,487,891.26	31,576,358.74
12/31/2054	27,760,000	5,300,000	33,060,000	1,487,891.26	31,572,108.74
12/31/2055	29,185,000	3,876,375	33,061,375	1,487,891.26	31,573,483.74
12/31/2056	30,680,000	2,379,750	33,059,750	1,487,891.26	31,571,858.74
12/31/2057	32,255,000	806,375	33,061,375	33,808,195.63	(746,820.63)
	513,745,000	490,958,500	1,004,703,500	77,700,987.80	927,002,512.20





## Debt Service Reserve Fund (cont'd)

### Sources:

<hr/>	
Bond Proceeds:	
Par Amount	513,745,000.00
	 up from \$480,575,000
	<hr/>
	513,745,000.00
	<hr/> <hr/>

### Uses:

<hr/>	
Project Fund Deposits:	
Project Fund	478,739,963.84
Other Fund Deposits:	
Debt Service Reserve Fund	33,064,250.00
	
Delivery Date Expenses:	
Cost of Issuance	285,000.00
Underwriter's Discount	1,651,730.82
	<hr/>
	1,936,730.82
	 increased par = increased UD
Other Uses of Funds:	
Rounding	4,055.34
	<hr/>
	513,745,000.00
	<hr/> <hr/>



## Bond Insurance

- ◆ Monoline insurance companies guarantee timely payment of debt service in consideration of an up-front insurance premium
- ◆ Premium charged equals a percentage of insured debt service
- ◆ Issuer may borrow at rating of insurer





# Bond Insurance – Premium Verification

## Annual Debt Service

Period Ending	Principal	Coupon	Interest	Debt Service
12/31/2027	-	-	13,007,250	13,007,250
12/31/2028	7,660,000	5.000%	25,823,000	33,483,000
12/31/2029	8,055,000	5.000%	25,430,125	33,485,125
12/31/2030	8,465,000	5.000%	25,017,125	33,482,125
12/31/2031	8,900,000	5.000%	24,583,000	33,483,000
12/31/2032	9,355,000	5.000%	24,126,625	33,481,625
12/31/2033	9,835,000	5.000%	23,646,875	33,481,875
12/31/2034	10,340,000	5.000%	23,142,500	33,482,500
12/31/2035	10,870,000	5.000%	22,612,250	33,482,250
12/31/2036	11,430,000	5.000%	22,054,750	33,484,750
12/31/2037	12,015,000	5.000%	21,468,625	33,483,625
12/31/2038	12,630,000	5.000%	20,852,500	33,482,500
12/31/2039	13,280,000	5.000%	20,204,750	33,484,750
12/31/2040	13,960,000	5.000%	19,523,750	33,483,750
12/31/2041	14,675,000	5.000%	18,807,875	33,482,875
12/31/2042	15,430,000	5.000%	18,055,250	33,485,250
12/31/2043	16,220,000	5.000%	17,264,000	33,484,000
12/31/2044	17,050,000	5.000%	16,432,250	33,482,250
12/31/2045	17,925,000	5.000%	15,557,875	33,482,875
12/31/2046	18,845,000	5.000%	14,638,625	33,483,625
12/31/2047	19,810,000	5.000%	13,672,250	33,482,250
12/31/2048	20,825,000	5.000%	12,656,375	33,481,375
12/31/2049	21,895,000	5.000%	11,588,375	33,483,375
12/31/2050	23,020,000	5.000%	10,465,500	33,485,500
12/31/2051	24,200,000	5.000%	9,285,000	33,485,000
12/31/2052	25,440,000	5.000%	8,044,000	33,484,000
12/31/2053	26,745,000	5.000%	6,739,375	33,484,375
12/31/2054	28,115,000	5.000%	5,367,875	33,482,875
12/31/2055	29,560,000	5.000%	3,926,000	33,486,000
12/31/2056	31,075,000	5.000%	2,410,125	33,485,125
12/31/2057	32,665,000	5.000%	816,625	33,481,625

Multiply aggregate debt service by 60 bps


### Formula Verification

	Formula	Value
	520,290,000	1,017,510,500
	497,220,500	
	<b>1,017,510,500</b>	
INSURE	0.60% of total Debt Service	6,105,063.00
DSRF	Maximum annual Debt Service	33,486,000.00
DSRF	125% of average annual Debt Service	42,396,270.83
DSRF	10% of Par Amount	52,029,000.00
DSRF	Debt Service Reserve Fund	33,486,000.00





## Bond Insurance (cont'd)

### Sources:

<hr/>	
Bond Proceeds:	
Par Amount	520,290,000.00
	 up from \$513,745,000
<hr/>	
	520,290,000.00
<hr/> <hr/>	

### Uses:

<hr/>	
Project Fund Deposits:	
Project Fund	478,739,963.84
Other Fund Deposits:	
Debt Service Reserve Fund	33,486,000.00
	 increased MADS = increased DSRF
Delivery Date Expenses:	
Cost of Issuance	285,000.00
Underwriter's Discount	1,671,935.23
Bond Insurance	6,105,063.00
	 increased par = increased UD
	<hr/>
	8,061,998.23
Other Uses of Funds:	
Rounding	2,037.93
<hr/>	
	520,290,000.00
<hr/> <hr/>	



## Capitalized Interest

- ◆ Portion of bond proceeds set aside to pay interest on the bonds for a specified period of time
- ◆ Commonly utilized over the construction period of a revenue-producing project to ensure that debt service expense is not required to be paid from project revenues until the project is operational and producing revenues
- ◆ Most commonly net-funded
- ◆ Capitalized period usually lasts less than three years
- ◆ Issuers typically will not amortize principal during capitalized interest periods



## Capitalized Interest (cont'd)

Principal not  
amortized during  
capitalized interest  
period

Period Ending	Principal	Coupon	Interest	Debt Service
12/31/2027	-	-	14,856,000	14,856,000
12/31/2028	-	-	29,712,000	29,712,000
12/31/2029	-	-	29,712,000	29,712,000
12/31/2030	9,970,000	5.000%	29,462,750	39,432,750
12/31/2031	10,480,000	5.000%	28,951,500	39,431,500
12/31/2032	11,020,000	5.000%	28,414,000	39,434,000
12/31/2033	11,585,000	5.000%	27,848,875	39,433,875
12/31/2034	12,180,000	5.000%	27,254,750	39,434,750
12/31/2035	12,805,000	5.000%	26,630,125	39,435,125
12/31/2036	13,460,000	5.000%	25,973,500	39,433,500
12/31/2037	14,150,000	5.000%	25,283,250	39,433,250
12/31/2038	14,875,000	5.000%	24,557,625	39,432,625
12/31/2039	15,640,000	5.000%	23,794,750	39,434,750
12/31/2040	16,440,000	5.000%	22,992,750	39,432,750
12/31/2041	17,285,000	5.000%	22,149,625	39,434,625
12/31/2042	18,170,000	5.000%	21,263,250	39,433,250
12/31/2043	19,100,000	5.000%	20,331,500	39,431,500
12/31/2044	20,080,000	5.000%	19,352,000	39,432,000
12/31/2045	21,110,000	5.000%	18,322,250	39,432,250
12/31/2046	22,195,000	5.000%	17,239,625	39,434,625
12/31/2047	23,330,000	5.000%	16,101,500	39,431,500
12/31/2048	24,530,000	5.000%	14,905,000	39,435,000
12/31/2049	25,785,000	5.000%	13,647,125	39,432,125
12/31/2050	27,110,000	5.000%	12,324,750	39,434,750
12/31/2051	28,500,000	5.000%	10,934,500	39,434,500
12/31/2052	29,960,000	5.000%	9,473,000	39,433,000
12/31/2053	31,495,000	5.000%	7,936,625	39,431,625
12/31/2054	33,110,000	5.000%	6,321,500	39,431,500
12/31/2055	34,810,000	5.000%	4,623,500	39,433,500
12/31/2056	36,595,000	5.000%	2,838,375	39,433,375
12/31/2057	38,470,000	5.000%	961,750	39,431,750
	594,240,000		584,169,750	1,178,409,750

Capitalized Interest  
through 9/11/2029





# Capitalized Interest (cont'd)

## Net Debt Service

Period Ending	Principal	Interest	Total Debt Service	Debt Service Reserve Fund	Capitalized Interest Fund	Net Debt Service
12/31/2027	-	14,856,000	14,856,000	-	14,856,000	-
12/31/2028	-	29,712,000	29,712,000	-	29,712,000	-
12/31/2029	-	29,712,000	29,712,000	-	29,712,000	-
12/31/2030	9,970,000	29,462,750	39,432,750	1,774,580.62	-	37,658,169.38
12/31/2031	10,480,000	28,951,500	39,431,500	1,774,580.62	-	37,656,919.38
12/31/2032	11,020,000	28,414,000	39,434,000	1,774,580.62	-	37,659,419.38
12/31/2033	11,585,000	27,848,875	39,433,875	1,774,580.62	-	37,659,294.38
12/31/2034	12,180,000	27,254,750	39,434,750	1,774,580.62	-	37,660,169.38
12/31/2035	12,805,000	26,630,125	39,435,125	1,774,580.62	-	37,660,544.38
12/31/2036	13,460,000	25,973,500	39,433,500	1,774,580.62	-	37,658,919.38
12/31/2037	14,150,000	25,283,250	39,433,250	1,774,580.62	-	37,658,669.38
12/31/2038	14,875,000	24,557,625	39,432,625	1,774,580.62	-	37,658,044.38
12/31/2039	15,640,000	23,794,750	39,434,750	1,774,580.62	-	37,660,169.38
12/31/2040	16,440,000	22,992,750	39,432,750	1,774,580.62	-	37,658,169.38
12/31/2041	17,285,000	22,149,625	39,434,625	1,774,580.62	-	37,660,044.38
12/31/2042	18,170,000	21,263,250	39,433,250	1,774,580.62	-	37,658,669.38
12/31/2043	19,100,000	20,331,500	39,431,500	1,774,580.62	-	37,656,919.38
12/31/2044	20,080,000	19,352,000	39,432,000	1,774,580.62	-	37,657,419.38
12/31/2045	21,110,000	18,322,250	39,432,250	1,774,580.62	-	37,657,669.38
12/31/2046	22,195,000	17,239,625	39,434,625	1,774,580.62	-	37,660,044.38
12/31/2047	23,330,000	16,101,500	39,431,500	1,774,580.62	-	37,656,919.38
12/31/2048	24,530,000	14,905,000	39,435,000	1,774,580.62	-	37,660,419.38
12/31/2049	25,785,000	13,647,125	39,432,125	1,774,580.62	-	37,657,544.38
12/31/2050	27,110,000	12,324,750	39,434,750	1,774,580.62	-	37,660,169.38
12/31/2051	28,500,000	10,934,500	39,434,500	1,774,580.62	-	37,659,919.38
12/31/2052	29,960,000	9,473,000	39,433,000	1,774,580.62	-	37,658,419.38
12/31/2053	31,495,000	7,936,625	39,431,625	1,774,580.62	-	37,657,044.38
12/31/2054	33,110,000	6,321,500	39,431,500	1,774,580.62	-	37,656,919.38
12/31/2055	34,810,000	4,623,500	39,433,500	1,774,580.62	-	37,658,919.38
12/31/2056	36,595,000	2,838,375	39,433,375	1,774,580.62	-	37,658,794.38
12/31/2057	38,470,000	961,750	39,431,750	40,322,415.31	-	(890,665.31)
	594,240,000	584,169,750	1,178,409,750	88,236,092.05	74,280,000	1,015,893,657.95

**Gross Capitalized Interest Requirements**

## Capitalized Interest Fund

**Net funded**

Date	Deposit	Interest @ 3%	Principal	Debt Service Reserve Fund	Scheduled Draws	Balance
03/01/2018	66,807,379.18	-	-	-	-	66,807,379.18
09/01/2027	-	1,002,110.69	12,966,599.00	887,290.31	14,856,000	53,840,780.18
03/01/2028	-	807,611.70	13,161,097.99	887,290.31	14,856,000	40,679,682.19
09/01/2028	-	610,195.23	13,358,514.46	887,290.31	14,856,000	27,321,167.73
03/01/2029	-	409,817.52	13,558,892.17	887,290.31	14,856,000	13,762,275.56
09/01/2029	-	206,434.13	13,762,275.56	887,290.31	14,856,000	-
	66,807,379.18	3,036,169.27	66,807,379.18	4,436,451.55	74,280,000	



## Capitalized Interest (cont'd)

### Sources:

Bond Proceeds:	
Par Amount	594,240,000.00
	594,240,000.00

↑ up from \$520,290,000

### Uses:

Project Fund Deposits:	
Project Fund	478,739,963.84
Other Fund Deposits:	
Debt Service Reserve Fund	39,435,125.00
Capitalized Interest Fund	66,807,379.18
	106,242,504.18
Delivery Date Expenses:	
Cost of Issuance	285,000.00
Underwriter's Discount	1,900,218.88
Bond Insurance	7,070,458.50
	9,255,677.38
Other Uses of Funds:	
Rounding	1,854.60
	594,240,000.00

↑ increased MADS = increased DSRF

↑ increased par = increased UD

↑ increased DS = increased insurance premium



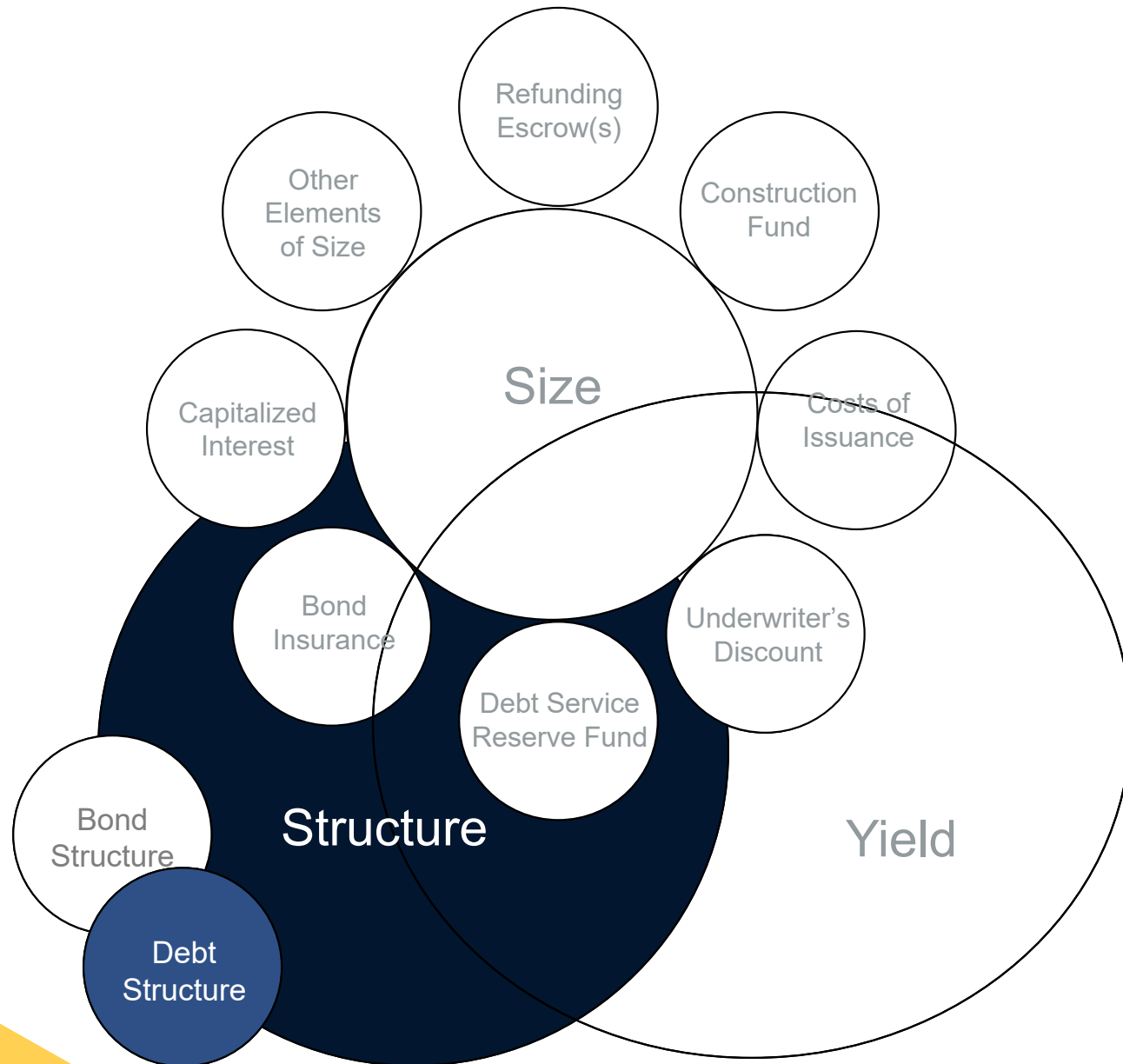
### Poll question 3

Issuers may choose to capitalize interest for their bond issue when:

- A. The project that the bonds are funding will not produce revenue for several years, while construction is under way.
- B. They want to achieve an overall lower par amount of bonds issued.
- C. They want to lower the all-in cost of the bonds.
- D. They want to use the capitalized interest funds to pay for costs of issuance.



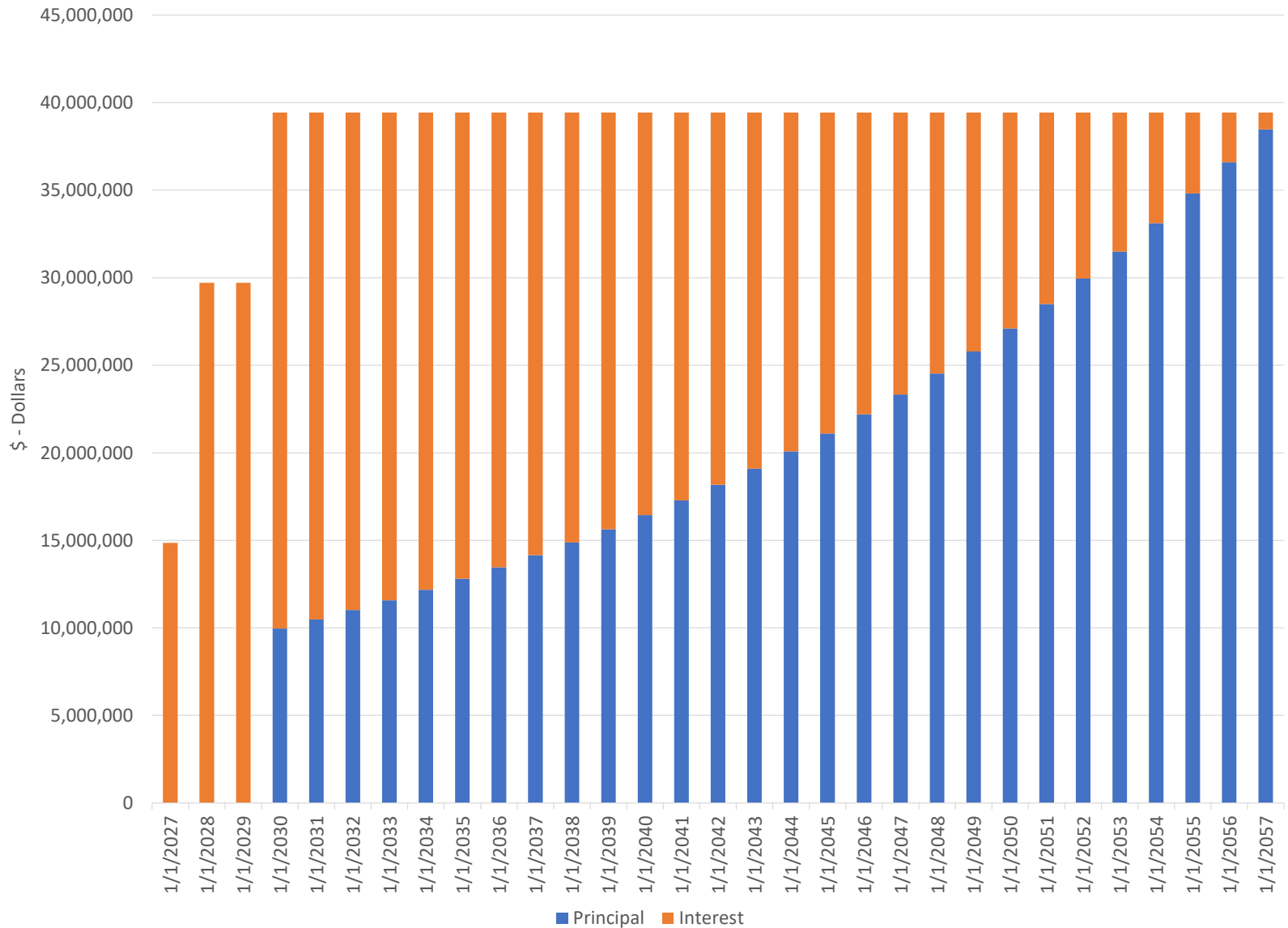
## Tao of Municipal Modeling — Debt Service Structure







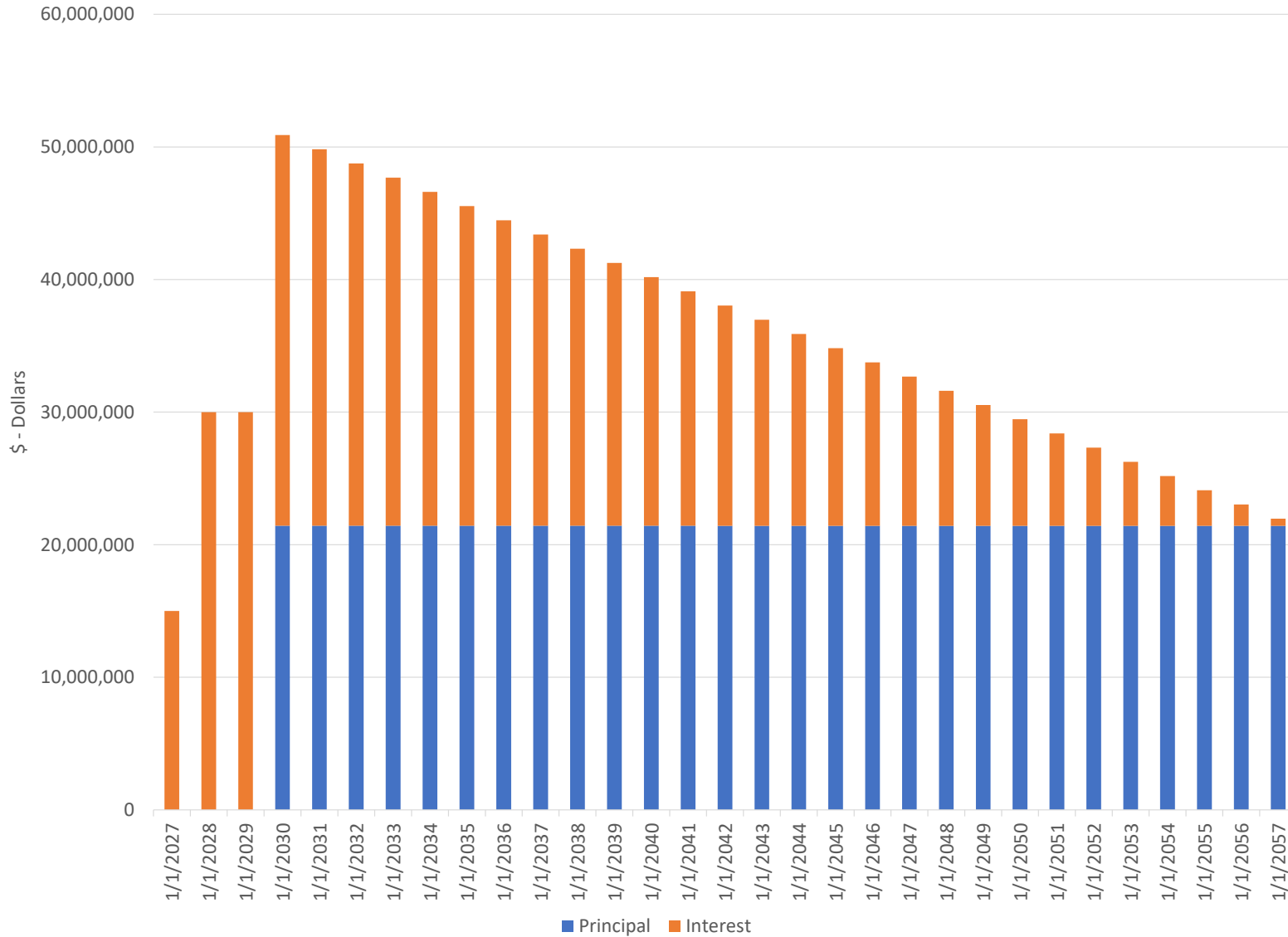
## Level Debt Service



**Aggregate Debt Service: \$1,178,409,750**



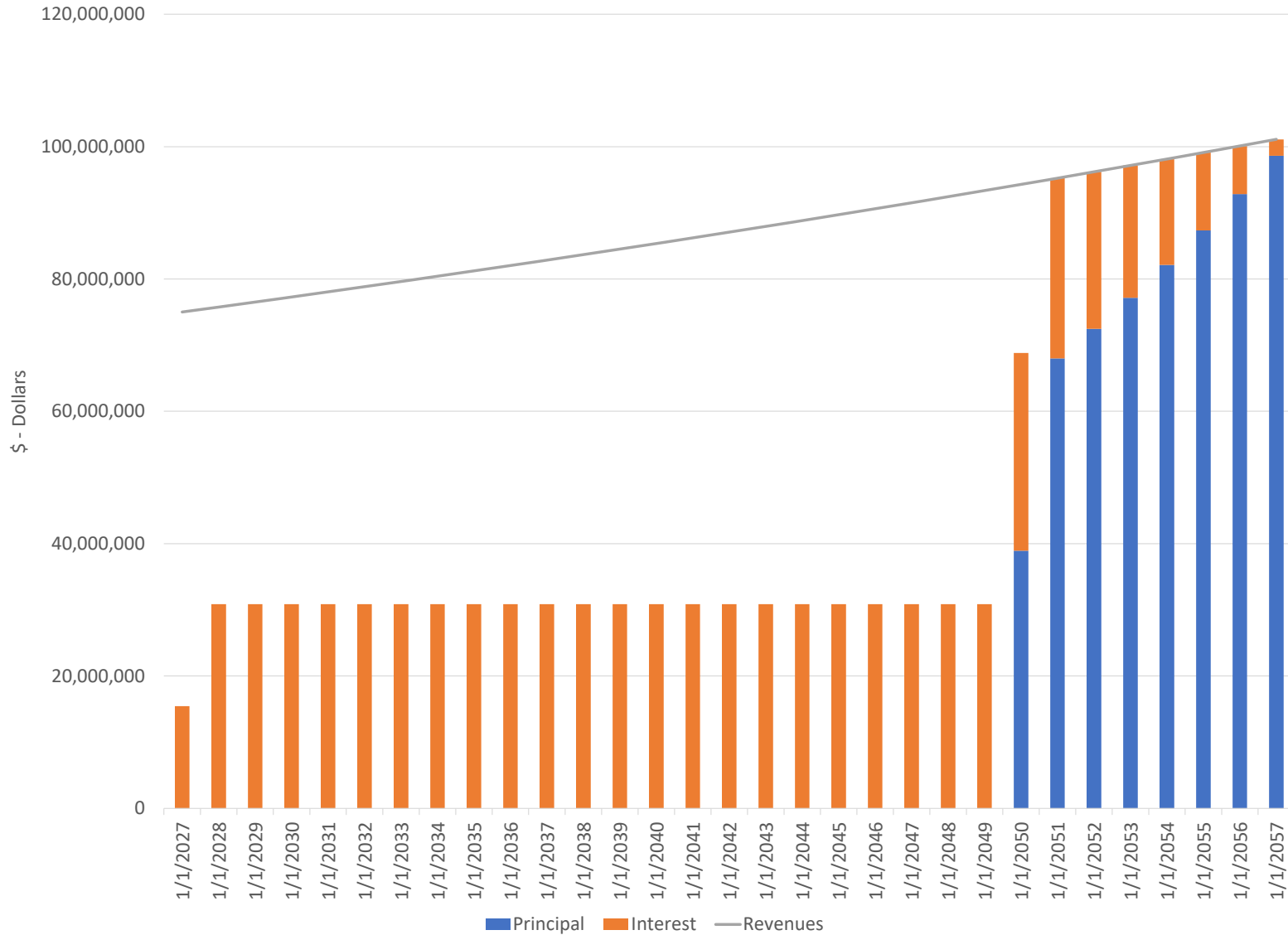
## Level Principal Amortization



**Aggregate Debt Service: \$1,094,903,000**



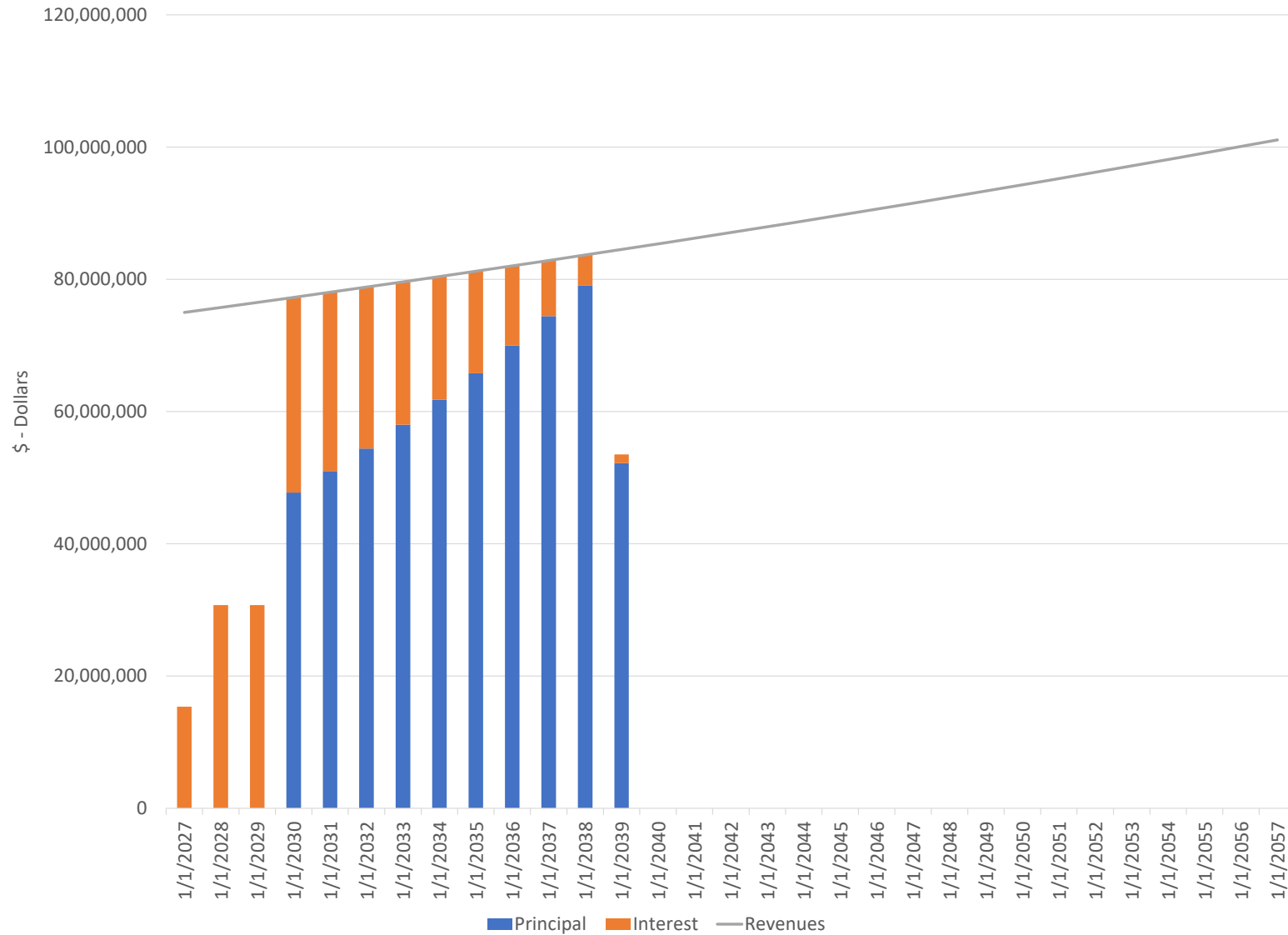
# Deferred Principal Amortization



**Aggregate Debt Service: \$1,450,386,750**



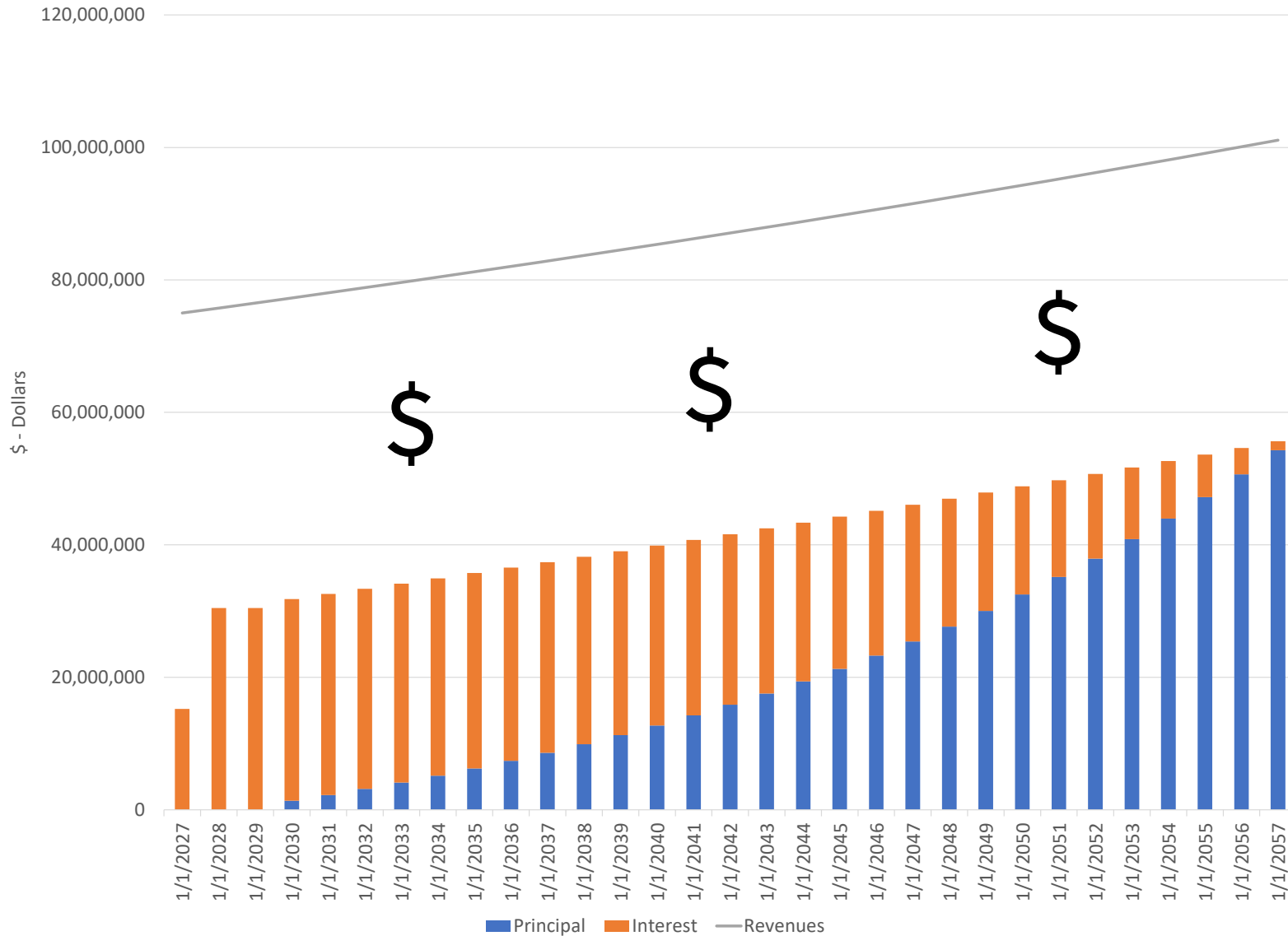
# Accelerated Principal Amortization



**Aggregate Debt Service: \$854,230,500**



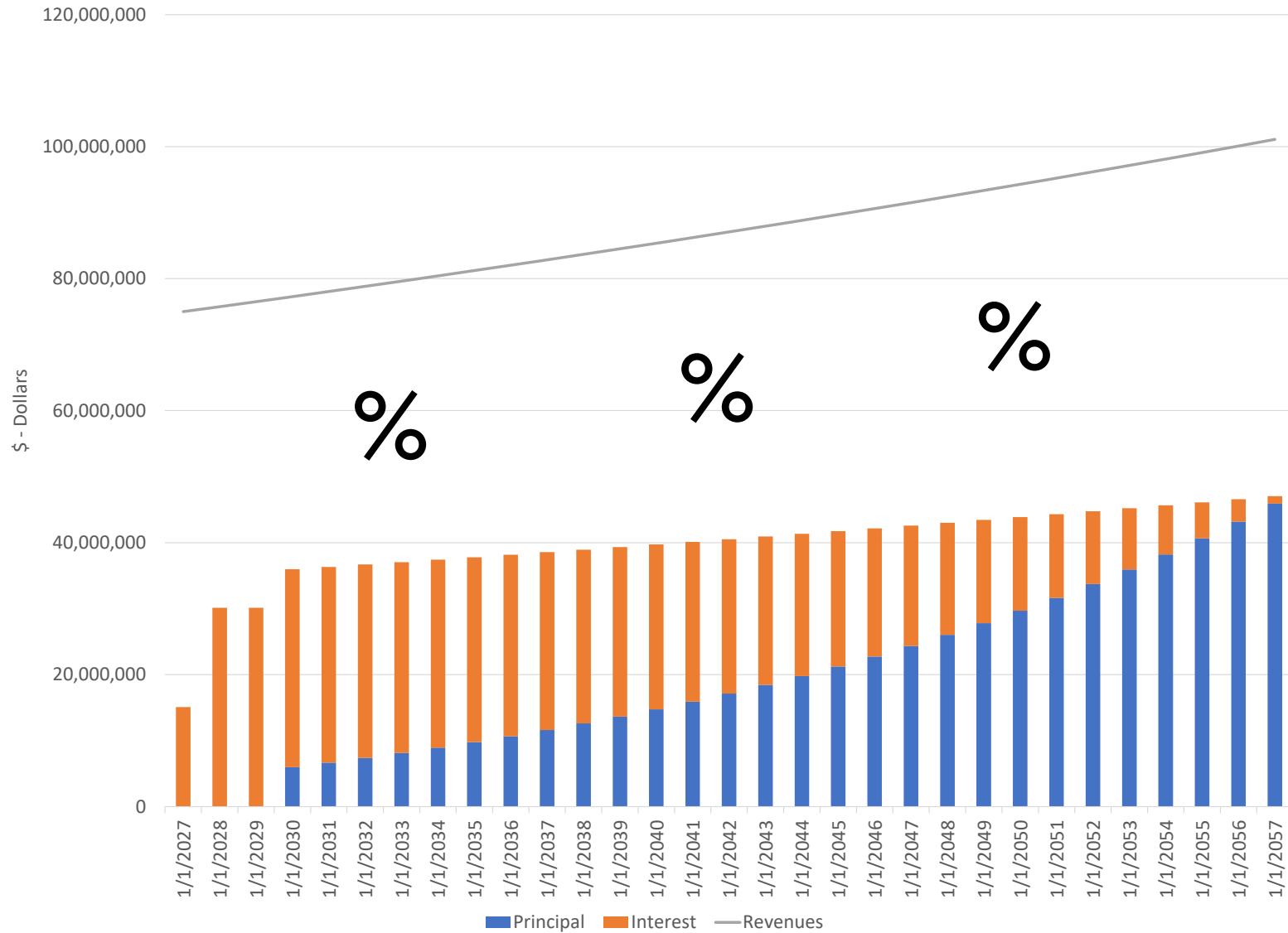
# Uniform Debt Service



**Aggregate Debt Service: \$1,285,892,000**



## Proportional Debt Service

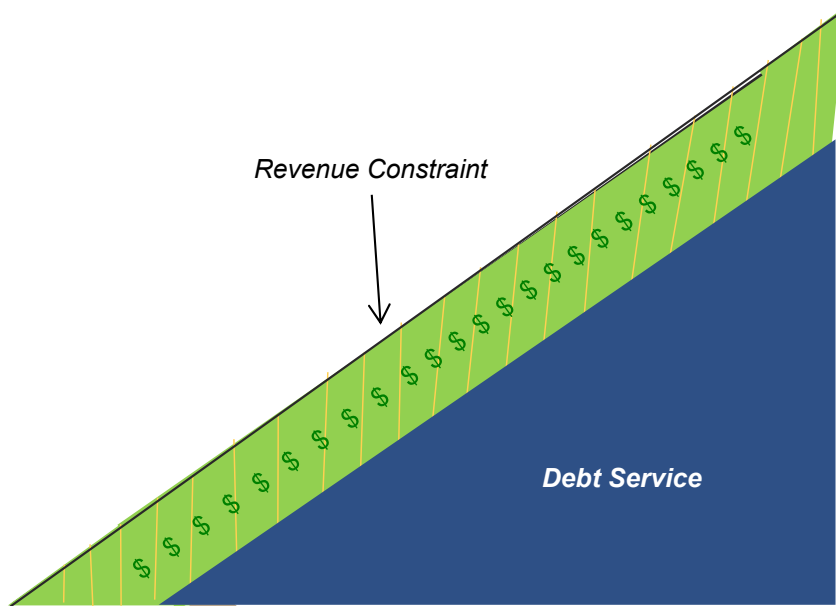


**Aggregate Debt Service: \$1,230,510,250**

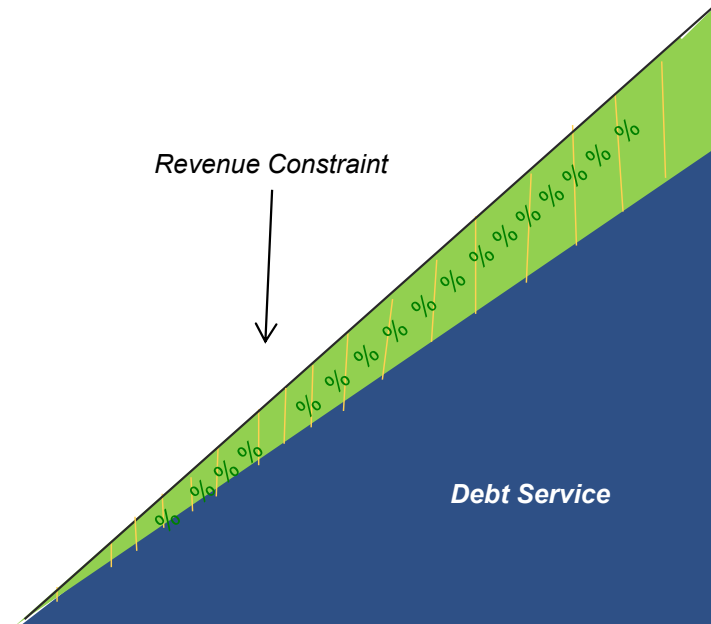


# Uniform vs. Proportional Debt Service

## UNIFORM DEBT SERVICE



## PROPORTIONAL DEBT SERVICE





## Poll question 4

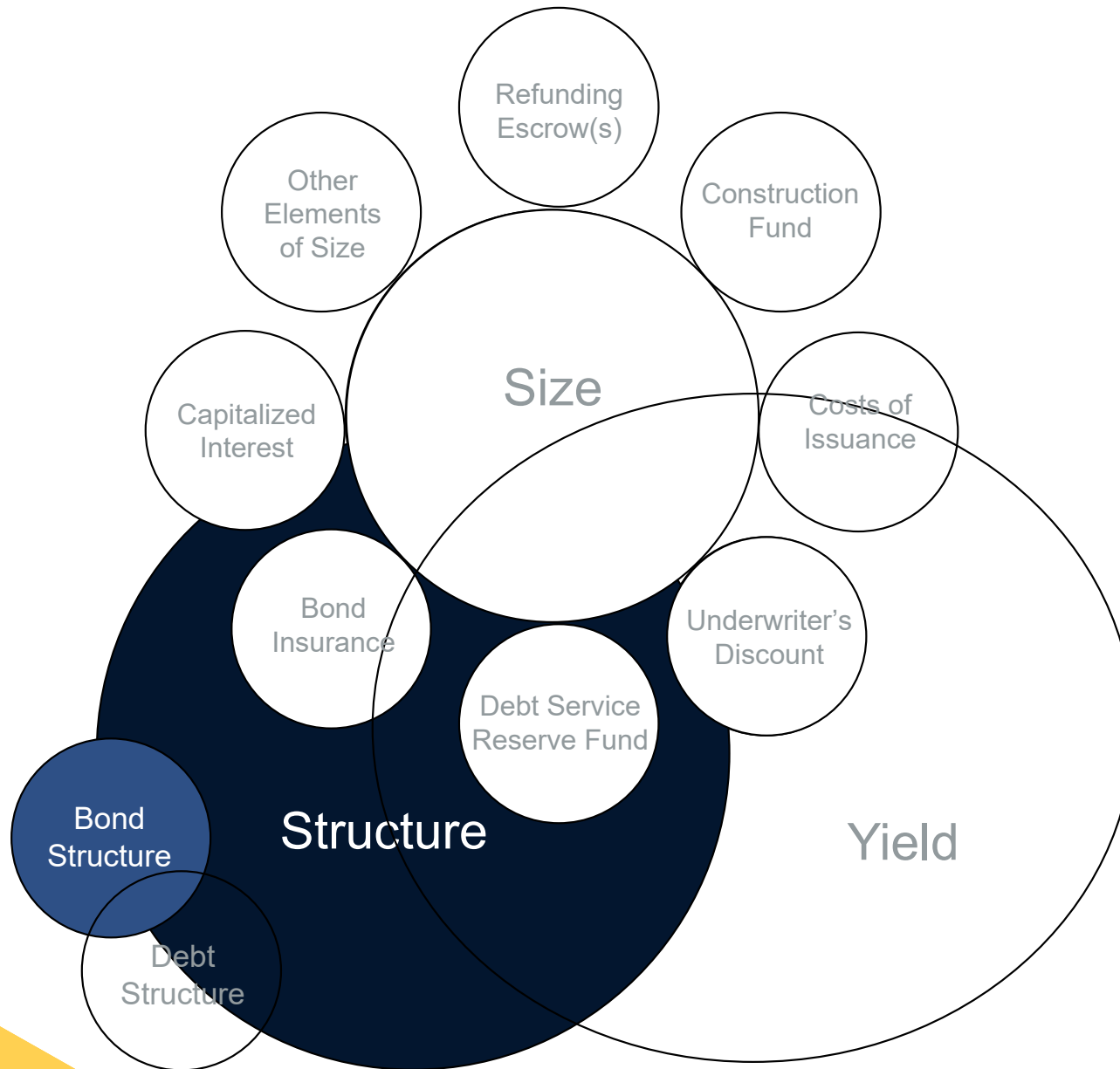
Which debt service structure would result in the **lowest** overall aggregate dollar cost of debt service if all other variables are held constant (project fund amount, coupons, yields, issuance costs, etc.), in a normal yield curve environment?

- A. Level debt service
- B. Equal principal
- C. Accelerated principal
- D. Deferred principal





## Tao of Municipal Modeling — Bond Structure





## Coupon/Yield Relationships

For a given coupon, the price an investor is willing to pay for a bond is inversely related to the yield.

	Original Issue Discount (OID)	Par Bond	Original Issue Premium (OIP)
<b>General Rule</b>	Coupon < Yield ↓ Price < 100	Coupon = Yield ↓ Price = 100	Coupon > Yield ↓ Price > 100
<b>Example (20-year bond)*</b>	Coupon = 4.00% Yield = 5.00% <b>Price = 87.448</b>	Coupon = 5.00% Yield = 5.00% <b>Price = 100.000</b>	Coupon = 6.00% Yield = 5.00% <b>Price = 112.551</b>

\*Assumes settlement date of 1/1/27 and final maturity of 1/1/47



## Issuer/Investor Preferences

- Given the same proceeds and present value of debt service, you would think an issuer would be essentially indifferent between issuing OID, Par, or OIP Bonds

	OID	Par	OIP
Par Amount	55,860,000	50,000,000	42,565,000
Coupon	3.000%	3.75%	5.000%
Yield	3.750%	3.75%	3.750%
Price	89.513%	100.000%	117.478%
Proceeds	50,001,962	50,000,000	50,004,511

*Assumes 20 year bond*

- Retail investors are typically less sensitive to coupon
  - Typically “buy and hold”
  - Less sensitive to market discount rules
  - Retail-only order periods allow par bonds to be pre-sold
  - Demand is strongest in years 1 - 10 and 20
- Institutional investors are NOT indifferent to coupon
  - Interest rate views (price protection, coupon reinvestment, duration and convexity management)
  - Possible tax implications (market discount rule)
  - Cash flow needs (replace refunded higher coupon bonds)



# Price Volatility

- Premium bonds provide price protection against rising interest rates.
- Discount bonds provide opportunity for investors to enhance their return in falling rate environment.

Price Volatility			
	OID	Par	OIP
Purchase Date	1/1/27	1/1/27	1/1/27
Maturity	1/1/47	1/1/47	1/1/47
Coupon	3.000%	3.750%	5.000%
Yield	3.750%	3.750%	3.750%
Price	89.513%	100.000%	117.478%
Purchase Date	4/1/27	4/1/27	4/1/27
Maturity	1/1/47	1/1/47	1/1/47
Coupon	3.000%	3.750%	5.000%
Yield	3.000%	3.000%	3.000%
Price	100.000%	111.111%	129.636%
% Price Change	11.716%	11.111%	10.349%
Purchase Date	4/1/27	4/1/27	4/1/27
Maturity	1/1/47	1/1/47	1/1/47
Coupon	3.000%	3.750%	5.000%
Yield	4.500%	4.500%	4.500%
Price	80.503%	90.248%	106.490%
% Price Change	(10.066%)	(9.752%)	(9.353%)

Most price appreciation

Falling Interest Rate Environment

Rising Interest Rate Environment

Least price depreciation



## Pricing Callable Bonds

- Depending on the type of bond an investor holds, the call option an issuer holds may affect the yield that the investor expects

	Par	Discount	Premium
Settlement Date	10/1/2027	10/1/2027	10/1/2027
Maturity	10/1/2047	10/1/2047	10/1/2047
Call	10/1/2037	10/1/2037	10/1/2037
Price*	100	87.448	112.551
Coupon	5.000%	4.000%	6.000%
Yield (to Maturity)	5.000%	5.000%	5.000%
<b>Yield (to Call)</b>	5.000%	5.660%	4.432%**

\*to maturity

\*\*Yield to worst

- If a callable premium bond is called, the investor receives a lower yield than originally represented (“yield to worst”)



## Bond Pricing Report for Callable Premium Bonds

Bond Component	Maturity Date	Amount	Rate	Yield	Price	Yield to Maturity	Call Date	Call Price	Premium (-Discount)
Series A of 2025, Serial Bonds A:									
	03/01/2026	4,315,000	5.000%	2.930%	101.430	-	-	-	61,704.50
	03/01/2027	4,540,000	5.000%	2.910%	103.448	-	-	-	156,539.20
	03/01/2028	4,770,000	5.000%	2.910%	105.395	-	-	-	257,341.50
	03/01/2029	5,015,000	5.000%	2.920%	107.250	-	-	-	363,587.50
	03/01/2030	5,275,000	5.000%	2.960%	108.895	-	-	-	469,211.25
	03/01/2031	5,545,000	5.000%	3.000%	110.411	-	-	-	577,289.95
	03/01/2032	5,830,000	5.000%	3.080%	111.547	-	-	-	673,190.10
	03/01/2033	6,125,000	5.000%	3.150%	112.565	-	-	-	769,606.25
	03/01/2034	6,440,000	5.000%	3.260%	111.767	3.425%	03/01/2033	100.000	757,794.80
	03/01/2035	6,770,000	5.000%	3.360%	111.047	3.638%	03/01/2033	100.000	747,881.90
	03/01/2036	7,120,000	5.000%	3.500%	110.049	3.845%	03/01/2033	100.000	715,488.80
	03/01/2037	7,485,000	5.000%	3.610%	109.272	4.000%	03/01/2033	100.000	694,009.20
	03/01/2038	7,870,000	5.000%	3.740%	108.362	4.146%	03/01/2033	100.000	658,089.40
	03/01/2039	8,270,000	5.000%	3.830%	107.737	4.249%	03/01/2033	100.000	639,849.90
	03/01/2040	8,695,000	5.000%	3.930%	107.048	4.346%	03/01/2033	100.000	612,823.60
	03/01/2041	9,140,000	5.000%	4.040%	106.296	4.438%	03/01/2033	100.000	575,454.40
		<u>103,205,000</u>							<u>8,729,862.25</u>



## Official Statement Table for Callable Premium Bonds

- Callable premium bonds are usually denoted with an asterisk or footnote when priced to a date other than the final maturity date.

<u>Maturity Date (March 1)</u>	<u>Principal Amount</u>	<u>Interest Rate</u>	<u>Yield</u>	<u>Price</u>
2026	\$4,315,000	5.000%	2.930%	101.430
2027	4,540,000	5.000%	2.910%	103.448
2028	4,770,000	5.000%	2.910%	105.395
2029	5,015,000	5.000%	2.920%	107.250
2030	5,275,000	5.000%	2.960%	108.895
2031	5,545,000	5.000%	3.000%	110.411
2032	5,830,000	5.000%	3.080%	111.547
2033	6,125,000	5.000%	3.150%	112.565
2034	6,440,000	5.000%	3.260%*	111.767*
2035	6,770,000	5.000%	3.360%*	111.047*
2036	7,120,000	5.000%	3.500%*	110.049*
2037	7,485,000	5.000%	3.610%*	109.272*
2038	7,870,000	5.000%	3.740%*	108.362*
2039	8,270,000	5.000%	3.830%*	107.737*
2040	8,695,000	5.000%	3.930%*	107.048*
2041	9,140,000	5.000%	4.040%*	106.296*

\* Price and yield are to the first call date of March 1, 2033.





## Optional Redemption Provision Example

### Redemption

Series A Bonds Optional Redemption. The Series A Bonds stated to mature on or after March 1, 2034 are subject to redemption prior to maturity at the option of the County, in whole or from time to time in part, in any order of maturities or portion of a maturity as selected by the County on March 1, 2033 or any date thereafter at a redemption price equal to 100% of the principal amount thereof, plus accrued interest to the redemption date. In the event that less than all of the Series A Bonds of a particular maturity are to be redeemed, the Series A Bonds of such maturity shall be drawn by the lot by the Paying Agent; provided, however, that while the Series A Bonds are held under the book-entry only system of DTC, the selection of Series A Bonds within a maturity to be redeemed shall be accomplished in accordance with the operating rules and practices of DTC.





## Poll question 5

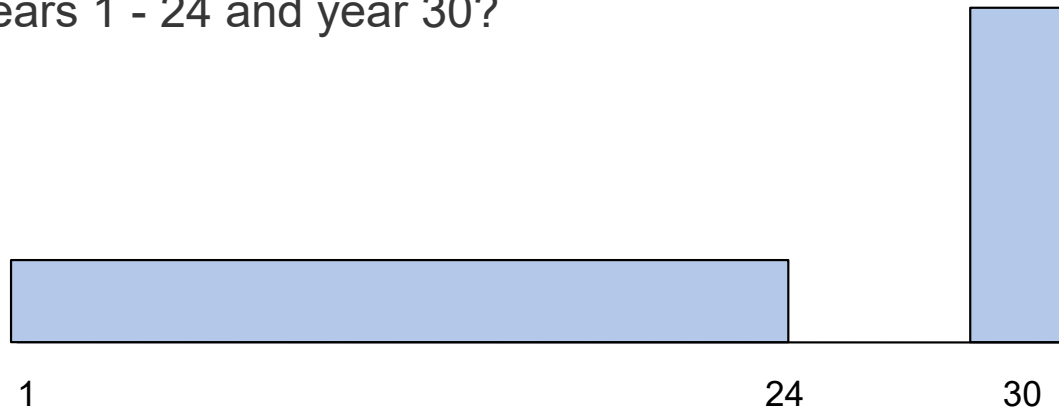
Callable premium bonds must be represented to investors in the Official Statement using which yield option?

- A. The lowest possible yield achieved between the bond's first optional redemption date and its maturity date.
- B. The highest possible yield achieved between the bond's first optional redemption date and its maturity date
- C. A 0% yield.
- D. Offering yields are not shown on the Official Statement.



## Mandatory Redemption Provisions - Term Bonds

- What are the implications if you are selling 30-year bonds and investors are only interested in years 1 - 24 and year 30?



- Debt service structure will not be level
- Yields may have to increase in order to interest buyers in years 25-29 (increased cost to issuer)
- To mitigate this, underwriters may spread out the 30 year maturity amount amongst the 25 - 30 year maturities as mandatory sinking funds. All maturities will be priced to the 30 year maturity.





## Mandatory Redemption Provisions - Term Bonds (cont'd)

<u>Maturity Date (March 1)</u>	<u>Principal Amount</u>	<u>Interest Rate</u>	<u>Yield</u>	<u>Price</u>	<u>CUSIP**</u>
2026	\$4,315,000	5.000%	2.930%	101.430	613580GT0
2027	4,540,000	5.000%	2.910%	103.448	613580GU7
2028	4,770,000	5.000%	2.910%	105.395	613580GV5
2029	5,015,000	5.000%	2.920%	107.250	613580GW3
2030	5,275,000	5.000%	2.960%	108.895	613580GX1
2031	5,545,000	5.000%	3.000%	110.411	613580GY9
2032	5,830,000	5.000%	3.080%	111.547	613580GZ6
2033	6,125,000	5.000%	3.150%	112.565	613580HA0
2034	6,440,000	5.000%	3.260%*	111.767*	613580HB8
2035	6,770,000	5.000%	3.360%*	111.047*	613580HC6
2036	7,120,000	5.000%	3.500%*	110.049*	613580HD4
2037	7,485,000	5.000%	3.610%*	109.272*	613580HE2
2038	7,870,000	5.000%	3.740%*	108.362*	613580HF9
2039	8,270,000	5.000%	3.830%*	107.737*	613580HG7
2040	8,695,000	5.000%	3.930%*	107.048*	613580HH5
2041	9,140,000	5.000%	4.040%*	106.296*	613580HJ1

**\$19,715,000 5.000% Term Bonds due March 1, 2043 at a Price of 104.945\*  
to Yield 4.240%\* (CUSIP\*\*: 613580HL6)**

*Term Bond*

**\$21,785,000 5.000% Term Bonds due March 1, 2045 at a Price of 104.077\*  
to Yield 4.370%\* (CUSIP\*\*: 613580HN2)**



## Mandatory Redemption Provisions - Term Bonds (cont'd)

*Series A Bonds Mandatory Sinking Fund Redemption.* The Series A Bonds stated to mature on March 1, 2043 and March 1, 2045, respectively (collectively, the “Series A Term Bonds”) are subject to mandatory redemption, in part, prior to their stated maturity by lot within a maturity, at a redemption price of 100% of the principal amount thereof plus accrued interest to the date fixed for redemption on March 1 of the years and in the annual principal amounts set forth in the following schedules (or such lesser principal amount as shall at the time represent all Series A Term Bonds which shall then be outstanding):

### Series A Term Bonds Due March 1, 2043

<u>Year</u>	<u>Principal Amount</u>
2042	\$9,610,000
2043*	10,105,000

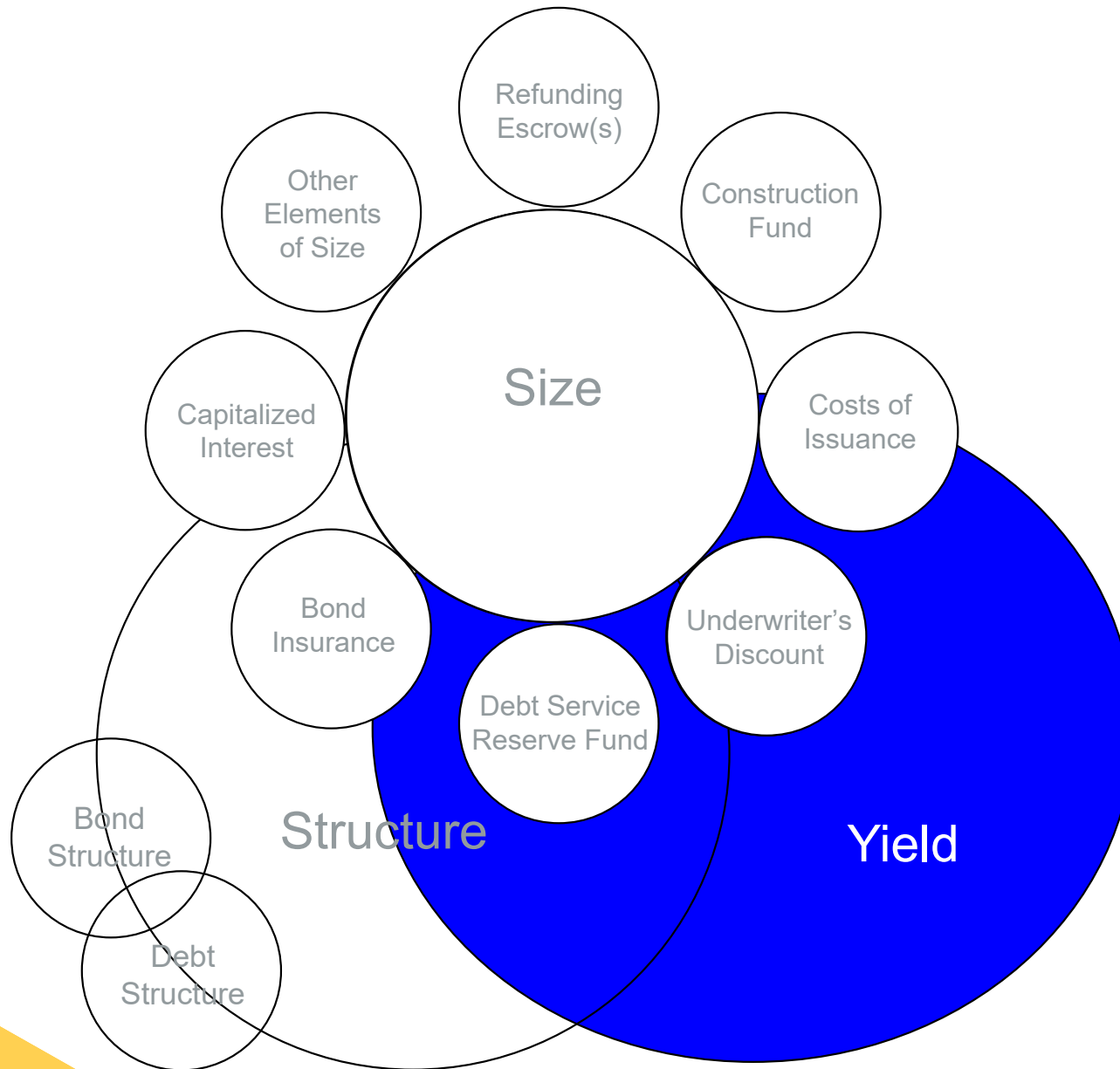
### Series A Term Bonds Due March 1, 2045

<u>Year</u>	<u>Principal Amount</u>
2044	\$10,620,000
2045*	11,165,000

\*Principal Maturity



## Tao of Municipal Modeling — Yield(s)





## Bond Statistics - Offsets in Calculations Differ

	TIC	All-In TIC	Arbitrage Yield
Principal (+)	100,000,000.00	100,000,000.00	100,000,000.00
Premium / Discount (+)	17,283,245.50	17,283,245.50	17,283,245.50
Accrued Interest (+)	0.00	0.00	0.00
Underwriter's Discount (-)	(500,000.00)	(500,000.00)	
Cost of Issuance (-)		(250,000.00)	
Qualified Expenses (-)		(386,638.50)	(386,638.50)
Target Value	116,783,245.50	116,146,607.00	116,896,607.00

Bond Insurance



## All Discount with Semi-Annual Debt Service

	TIC	All-In TIC	Arbitrage Yield
Target Value	116,783,245.50	116,146,607.00	116,896,607.00
Target Date (Delivery)	1/1/2027	1/1/2027	1/1/2027
Yield	1.884264%	1.991466%	1.865146%

Semi-Annual Debt Service Schedule					Yield			
Dates	Principal	Coupon	Interest	Debt Service	Dates	True Interest Cost (TIC)	All-In True Interest Cost	Arbitrage Yield
1/1/2027					1/1/2027			
4/1/2027			1,250,000	1,250,000	4/1/2027	1,244,152.96	1,243,822.76	1,244,211.87
10/1/2027	5,935,000	5.000%	2,500,000	8,435,000	10/1/2027	8,317,185.28	8,310,564.94	8,318,366.85
4/1/2028			2,351,625	2,351,625	4/1/2028	2,297,136.93	2,294,090.27	2,297,680.86
10/1/2028	8,530,000	5.000%	2,351,625	10,881,625	10/1/2028	10,530,284.31	10,510,736.85	10,533,775.25
4/1/2029			2,138,375	2,138,375	4/1/2029	2,050,018.29	2,045,126.85	2,050,892.12
10/1/2029	8,870,000	5.000%	2,138,375	11,008,375	10/1/2029	10,455,013.78	10,424,532.08	10,460,460.84
4/1/2030			1,916,625	1,916,625	4/1/2030	1,803,292.05	1,797,080.27	1,804,402.44
10/1/2030	9,315,000	5.000%	1,916,625	11,231,625	10/1/2030	10,468,851.55	10,427,252.66	10,476,289.90
4/1/2031			1,683,750	1,683,750	4/1/2031	1,554,753.64	1,547,753.82	1,556,005.68
10/1/2031	9,790,000	5.000%	1,683,750	11,473,750	10/1/2031	10,495,832.27	10,443,032.56	10,505,279.36
4/1/2032			1,439,000	1,439,000	4/1/2032	1,304,066.74	1,296,817.96	1,305,364.12
10/1/2032	10,305,000	5.000%	1,439,000	11,744,000	10/1/2032	10,543,446.39	10,479,275.04	10,554,935.30
4/1/2033			1,181,375	1,181,375	4/1/2033	1,050,707.55	1,043,758.31	1,051,952.10
10/1/2033	10,860,000	5.000%	1,181,375	12,041,375	10/1/2033	10,609,567.63	10,533,803.81	10,623,140.49
4/1/2034			909,875	909,875	4/1/2034	794,201.79	788,111.84	795,293.13
10/1/2034	11,455,000	5.000%	909,875	12,364,875	10/1/2034	10,692,183.08	10,604,564.10	10,707,889.57
4/1/2035			623,500	623,500	4/1/2035	534,122.21	529,464.11	534,957.48
10/1/2035	12,115,000	5.000%	623,500	12,738,500	10/1/2035	10,810,605.02	10,710,637.72	10,828,536.25
4/1/2036			320,625	320,625	4/1/2036	269,560.73	266,926.32	270,033.41
10/1/2036	12,825,000	5.000%	320,625	13,145,625	10/1/2036	10,948,837.25	10,836,080.55	10,969,075.17
Totals	100,000,000		28,879,500	128,879,500		116,773,819.46	116,133,432.82	116,888,542.19



## Definitions

### ◆ True Interest Cost (TIC):

Rate, compounded semi-annually, necessary to discount the amounts payable on the respective principal and interest payment dates to the purchase price received for the new issue securities. TIC computations produce a figure slightly different from the net interest cost ("NIC") method since TIC considers the time value of money while NIC does not.

### ◆ All-In True Interest Cost (AIC):

Discount rate, assuming semiannual compounding and a 30/360-day calendar, which is the net present value (NPV) of all payments of principal, interest, and future expenses equal to the par amount of bonds plus accrued interest plus premium less original issue discount less insurance premium less costs of issuance less other up front expenses, as applicable. The cashflows can be discounted to either the delivery date or the dated date.

### ◆ Arbitrage Yield:

"Arbitrage" refers to the difference between the interest rate at which bonds are issued, a.k.a. the Arbitrage Yield, and the interest rate at which bond proceeds are invested, a.k.a. the Investment Yield. If the Investment Yield exceeds the Arbitrage Yield, the dollar difference in earnings is "positive arbitrage" and must be rebated to the IRS unless certain exceptions are met. Common exceptions are for "small issuers" and for issuers who meet certain "spend-down" requirements. Conversely, if the Investment Yield is less than the Arbitrage Yield, the dollar difference in earnings is "negative arbitrage" and no rebate is owed.





## Definitions (cont'd)

### ◆ Net Interest Cost (NIC):

A method of computing the interest expense to the issuer of bonds, which may serve as the basis of award in a competitive sale. NIC takes into account any premium or discount applicable to the issue, as well as the dollar amount of coupon interest payable over the life of the issue. NIC does not take into account the time value of money (as would be done in other calculation methods, such as the “true interest cost” (TIC) method). The term “net interest cost” refers to the overall rate of interest to be paid by the issuer over the life of the bonds. (Disadvantage: No consideration for time value of money)

$$\frac{\text{Total coupon interest payments} + \text{premium}(\text{discount})}{\text{Bond Years}}$$



# Why Arbitrage Yield Matters – IRS Regulations



## IRS Regulations of Municipal Bonds

### ◆ Benefit of tax-exempt bonds:

- Cost of financing is generally lower for issuers – *public benefit for public projects*
- Interest paid to bondholders is not includable in their gross income for federal income tax purposes.
- *This tax-exempt status remains throughout the life of the bonds provided that all applicable federal tax laws are satisfied both at the time the bonds are issued and throughout the term of the bonds.*

### ◆ Federal Laws

- Tax Code 1954 and 1986 - § 103, 141-150
- Constitution
- Regulations
- Rulings, Revenue Procedures, Private Letter Rulings

### ◆ Primary objectives of federal laws

- No private activity
- No arbitrage



## Arbitrage Rebate & Yield Restriction – It's the Law

- ◆ To prevent abuses, the tax code limits the permitted uses of tax-exempt bonds
  - Prevents issuance of more bonds than are necessary
  - Prevents issuance of bonds earlier than is necessary
  - Prevents bonds from remaining outstanding longer than is necessary
  - **In other words, borrow what you need, when you need it, for an appropriate duration based on what is being financed.**
- ◆ Tax law and Regulations create financial disincentives (i.e., arbitrage rebate) to prevent issuance of tax-exempt debt for profit-driven reasons
  - Yield restriction – IRC Section 148(b)
  - Arbitrage rebate – IRC Section 148(f)
  - Overlapping requirements – “Belt & Suspenders”
- ◆ Applies to **every** tax-exempt borrowing and some taxable subsidy obligations



## Exceptions to Arbitrage Rebate

- ◆ The Small Issuer Exception
  
- ◆ The Spending Exceptions
  - 6-month spending exception
  - 18-month spending exception
  - 2-year spending exception
  
- ◆ “Bona Fide” Debt Service Fund exception
- ◆ Electing to pay the 1.5% penalty in lieu of rebate
- ◆ Investing in tax-exempt obligations (eliminating the “arbitrage”)



## Small Issuer Exception

### ◆ Calendar year exception

- \$5 million of governmental bonds for municipalities
- \$15 million per year for public school construction

### ◆ Requirements

- General taxing powers
- Governmental bonds (not private activity bonds)
- At least 95% of the proceeds must be used for local governmental activities

### ◆ Exclusion of current refunding issue in certain circumstances



## Spending Exceptions – Can Be Internally Monitored

- ◆ “Reward” for spending bond proceeds quickly
- ◆ Allowed to keep positive arbitrage
- ◆ Simple way to establish compliance (no FV, no yields)
- ◆ Must meet each benchmark, no catch-up allowed

\* Exceptions for 5% of the proceeds of the issue if spent within one year

\*\* De minimis (lesser of 3% or \$250K) and reasonable retainage (5% spent in 12 months) exceptions may apply for last benchmark

6-Month	18-Month	2-Year (ACP)
All gross proceeds	All new money	Construction issues
✓ 6 months 100% *	✓ 6 months 15%	✓ 6 months 10%
	✓ 12 months 60%	✓ 12 months 45%
	✓ 18 months 100% **	✓ 18 months 75%
		✓ 24 months 100% **



## Funds Subject to Rebate

**PROCEEDS**

+

**REPLACEMENT PROCEEDS**

=

**GROSS  
PROCEEDS**

Sale Proceeds /  
Investment Proceeds

- Project / Construction Funds
- Capitalized Interest Funds
- Debt Service Reserve Funds
- Escrow Funds
- Costs of Issuance Funds
- Interest earnings

Transferred Proceeds  
Any of the above

Cash / Equity /  
Revenue Funded

- Debt Service Funds
- Debt Service Reserve Funds
- Any “Pledged” Fund

All subject to Rebate

Exceptions  
may apply



**Thank you.**



**pfm**



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