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TEACHERS RETIREMENT ASSOCIATION
STATE OF MINNESOTA

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REPORT OF ACTUARIAL VALUATION

JUNE 30, 1976

Teachers Retirement Association
State of Minnesota

As requested by the Board of Trustees of the Fund, we have made an actuarial valuation of the Fund as of June 30, 1976, in accordance with the provisions of Minnesota Statutes, Sections 356.20 to 356.23. The results of our analysis are presented in the following report.

Liability for Annuities. Table 1 summarizes the census of annuities in force showing for each type of annuitant the number, annual amount and the present value of annuities. The present value was calculated using the 1971 Group Annuity Mortality Table for males set back 6 years with an interest assumption of 5%. Section 356.36 benefit increases which became effective on July 1, 1976 have not been included.

The liability for annuities shown in Table 1 are as follows:

Summary of Liability for Annuities

Adjustable Fixed Benefit Fund	\$ 239,670,297.19
Variable Annuity Fund	33,722.58
Disability Benefits	5,755,822.00
1915 Law Annuities	147,756.76
Survivor Benefits	<u>1,740,812.53</u>
Total	\$ 247,348,411.06

Liability for Prior Service. Table 2 summarizes the census of active members and Table 3 the census of inactive members. These are shown separately for the Basic and Coordinated Group with each of these groups separated according to the benefit plan election in effect as of the date of this valuation. The accrued liability for prior service for each of these groups, exclusive of any participation in the Variable Annuity Fund, has been determined as follows:

Summary of Liability for Prior Service

	<u>Basic</u>	<u>Coordinated</u>
<u>Active Members</u>		
Full Formula	\$275,874,489	\$ 501,433,746
Partial Formula	45,817,588	139,853,942
Full Variable	<u>-0-</u>	<u>16,458</u>
Total	\$321,692,077	\$ 641,304,146
<u>Inactive Members</u>		
Full Formula	\$ 22,334,635	\$ 30,096,010
Partial Formula	286,096	1,761,796
Full Variable	<u>-0-</u>	<u>247,910</u>
Total	\$ 22,620,731	\$ 32,105,716
Total accrued prior service liability		\$1,017,722,670

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For members under a formula plan the accrued prior service liability has been determined using the entry age normal cost method. The assumed rates of death disability and withdrawal are shown in Table 4. It was assumed that individual salaries would increase at the rate of 3.5% each year. An interest assumption of 5% was used.

For members under the full variable money purchase plan the accrued prior service liability has been determined to be represented by 180% of the members accumulation at June 30, 1957 plus 220% of the members accumulated fixed deposits with interest to the valuation date plus 300% of any unpaid arrears.

Assets of the Fund. Table 5 summarizes the assets and current liabilities of the Fund. As required by Section 356.20 Subd. 5 the deferred yield adjustment account, amounting to \$4,761,445 is shown as an asset. This account represents realized losses incurred in the disposition of debt securities. Bonds are shown at amortized cost. The market value of stocks exceeded cost by \$12,284,822 of which \$3,491,789 has been recognized as an asset.

Unfunded Liability. The difference between the actuarial liabilities and the assets available for funding these liabilities is the actuarial deficit or unfunded liability. The following table compares these amounts as of June 30, last year and this year. The liability for benefits payable from the Variable Annuity Fund is assumed to be equal to the participation in such fund included with the assets.

	6-30-75	6-30-76
Required Reserves For:		
Adjustable Fixed Benefit Annuities	\$ 205,174,122	\$ 239,670,297
Variable Annuity Fund	20,191,487	28,756,819
Other Annuities	5,787,017	7,614,385
Accrued Prior Service	900,794,073	1,017,722,670
Total Actuarial Liabilities	\$1,131,946,699	\$1,293,764,171
Assets in Excess of Current Liabilities	586,870,721	665,810,655
Unfunded Liability	\$ 545,075,978	\$ 627,953,516
Funding Ratio	51.8%	51.5%

During the year unfunded liabilities increased by \$82,877,538. - Of this increase \$72,672,005 was in the basic fund and \$10,205,533 was in the Adjustable Fixed Benefit Fund. An analysis of the causes of this increase is presented in the appendix to this report.

Annuity Stabilization Account. As of June 30, 1976 the required reserves for annuities being paid from the Adjustable Fixed Benefit Fund exceeded the participation in such Fund by \$29,830,235. It has been suggested that this deficit is not a responsibility of the Association and that an "Annuity Stabilization Account" be established as an asset equal to the amount of the deficit. If this approach were accepted the following changes in the funding position of the Association as reported above would result:

Teachers Retirement Association
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	<u>6-30-75</u>	<u>6-30-76</u>
Assets in Excess of Current Liabilities	\$ 606,495,423	\$ 695,640,890
Unfunded Liability	\$ 525,451,276	\$ 598,123,281
Funding Ratio	53.6%	53.8%

Normal Support Rate. Current statutes provide for equal employer and employee contributions of 8% of salary for the Basic Group and 4% for the Coordinated Group. For members under a formula plan the aggregate entry age normal cost to provide retirement benefits was determined as follows:

	<u>Employer</u>	<u>Employee</u>	<u>Total</u>
Basic - Full Formula	7.51%	8.00%	15.51%
Partial Formula	7.00	8.00	15.00
Coordinated - Full Formula	4.13	4.00	8.13
Partial Formula	3.89	4.00	7.89

These entry age normal cost rates were used in the determination of the accrued liability for members under a formula plan.

Ancillary Benefits. The cost of disability and survivor benefits provided by the Fund, in excess of interest forfeited on refunded deposits, during the year amounted to \$1,751,309. This represents 0.23% of the current annual payroll.

Administrative Expense. The cost of administration of the Fund during the year amounted to \$789,628. This represents 0.10% of the current annual payroll.

Additional Support Rate. An additional contribution of 2.5% of salary is provided by statute to amortize the actuarial deficit. The following table shows for this year and last year the computations of the additional support rate required to amortize the actuarial deficit of the basic fund by June 30, 1997.

	<u>6-30-75</u>	<u>6-30-76</u>
(a) Unfunded Liability	\$ 525,451,276	\$ 598,123,281
(b) Annual Cost to Amortize by 1997	39,918,796	46,651,287
(c) Current Annual Payroll	663,335,223	752,040,857
(d) Additional Support Rate (b) / (c)	6.0%	6.20%

Interest at the rate of 5% on the current unfunded liability amounts to \$29,906,164 or 3.98% of the current annual payroll.

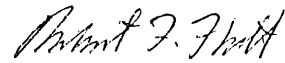
It is apparent that the additional support rate now provided by statute is inadequate. Legislative action should be sought to increase this rate to at least 6%.

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Income From Investments. Income from investments earned during the year, and not allocated to the Adjustable Fixed Benefit Fund or Variable Annuity Fund, amounted to \$19,796,825. This represents a return of 5.02% on the mean assets in excess of current liabilities excluding participation in the Variable Fund and the Adjustable Fixed Benefit Fund. This includes recognized unrealized depreciation on stocks in the amount of \$1,976,748 and realized gains of \$415,930 on sale of investments. Interest at the rate of 5.75% was credited to members accumulated deposits.

Respectfully submitted,

BROWN AND FLOTT


Robert F. Flott

Teachers Retirement Association
State of Minnesota

TABLE 1

SUMMARY OF CENSUS OF ANNUITANTS

<u>Type of Annuity</u>	<u>Number</u>	<u>Annual Amount</u>	<u>Present Value</u>
<u>Annuities Payable from Adjustable Fixed Benefit Fund</u>			
<u>1. Service Retirement Annuitants</u>			
as of 6-30-75	6448	\$17,706,845.88	\$193,416,406.64
net adjustments made in 6-30-75 bal.	--	+ 12,358.92	
granted during year	745	3,366,064.98	
terminated by death	146	343,110.60	
expired	1	1,801.92	
cancelled	2	10,371.24	
as of 6-30-76	7044	\$20,729,986.02	\$227,436,957.14
<u>2. Beneficiaries of Deceased Members</u>			
as of 6-30-75	107	\$ 277,231.56	\$ 2,494,398.10
granted during year	4	20,789.28	
expired	5	6,065.76	
as of 6-30-76	106	\$ 291,955.08	\$ 2,601,650.68
<u>3. Beneficiaries of Deceased Annuitants</u>			
as of 6-30-75	268	\$ 484,295.04	\$ 2,578,533.04
transfer from type 1	51	141,059.04	
expired	46	69,094.20	
as of 6-30-76	273	\$ 556,259.88	\$ 3,316,491.65
<u>4. Section 136.82 Supplemental Annuities</u>			
as of 6-30-75	74	\$ 26,427.96	\$ 293,934.78
terminated by death	2	1,150.80	
granted during year	11	7,178.04	
as of 6-30-76	83	\$ 32,455.20	\$ 364,098.01
<u>5. Section 354.59 Allowances and 354.581 Increases</u>			
as of 6-30-75		\$ 831,232.80	\$ 6,390,849.95
expirations		36,444.96	
as of 6-30-76		\$ 794,787.84	\$ 5,951,099.71
 Total 6-30-75 MAFBF	 6897	 \$19,326,033.24	 \$205,174,122.51
Total 6-30-76 MAFBF	7506	\$22,405,444.02	\$239,670,297.19

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<u>Type of Annuity</u>	<u>Number</u>	<u>Annual Amount</u>	<u>Present Value</u>
<u>Annuities Payable from Variable Annuity Fund</u>			
<u>7. Service Retirement Annuitants</u>			
as of 6-30-75	11	\$ 1,511.04	\$ 20,218.67
less adjustment for variable loss		- 150.00	
granted during year	10	1,191.24	
as of 6-30-76	21	\$ 2,552.28	\$ 33,722.58
<u>Other Annuities and Benefits</u>			
<u>8. Disability Annuitants</u>			
as of 6-30-75	97	\$ 281,709.96	\$ 3,916,705.74
net adjustments made in 6-30-75 bal.		- 242.28	
returned to teaching	1	5,400.60	
granted during year	43	194,551.92	
terminated by death	4	17,596.92	
transfers to type 1	15	39,405.96	
as of 6-30-76	120	\$ 413,616.12	\$ 5,755,822.00
<u>9. Survivors Benefits</u>			
as of 6-30-75	163	\$ 179,968.56	\$ 1,729,063.17
granted during year	4	6,261.96	
terminated	17	12,166.32	
as of 6-30-76	150	\$ 174,064.20	\$ 1,740,812.53
<u>10. 1915 Law Retirement Annuitants</u>			
as of 6-30-75	33	\$ 31,370.64	\$ 141,247.81
terminated by death	5	4,756.56	
as of 6-30-76	28	\$ 26,614.08	\$ 117,750.52
<u>11. Section 334.44, Subd. 5 Increases</u>			
as of 6-30-75	--	\$ 7,920.00	\$ 35,928.72
terminated by death		1,200.00	
as of 6-30-76	--	\$ 6,720.00	\$ 30,006.24

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TABLE 2

SUMMARY OF CENSUS OF ACTIVE MEMBERS

	<u>BASIC GROUP</u>		<u>COORDINATED GROUP</u>	
	<u>Number</u>	<u>Annual Payroll</u>	<u>Number</u>	<u>Annual Payroll</u>
<u>Money Purchase - Full Variable</u>				
At 6-30-75			35	\$ 133,833
* Less than 20 days of resumed service			0	
At 6-30-76			35	\$ 174,535
<u>Full Formula</u>				
At 6-30-75	3,399	\$ 50,871,846	43,165	\$423,471,848
New Entrants	189		7,888	
To Inactive	4		389	
Separation with Refund	5		3,055	
Deaths	3		49	
Disability Retirement	15		20	
Service Retirement	210		406	
At 6-30-76	3,351	\$ 54,259,271	47,134	\$491,573,615
<u>Partial Formula</u>				
At 6-30-75	727	\$ 12,464,512	13,131	\$176,393,184
New Entrants			97	
To Inactive	2		9	
Separation with Refund			346	
Deaths			16	
Disability Retirement			8	
Service Retirement	2		4	
At 6-30-76	723	\$ 13,601,702	12,845	\$192,431,734
<u>Total</u>				
Total at 6-30-75	4,126	\$ 63,336,358	56,331	\$599,998,865
Total at 6-30-76	4,074	\$ 67,860,973	60,014	\$684,179,384

* Transfers in minus transfers out

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TABLE 3

SUMMARY OF CENSUS OF INACTIVE MEMBERS

	<u>Basic Group</u>	<u>Coordinated Group</u>
<u>Money Purchase - Full Variable</u>		
At 6-30-75		189
Separation with Refund		<u>23</u>
At 6-30-76		166
<u>Full Formula</u>		
At 6-30-75	1,041	14,732
From Active	4	389
Separation with Refund	19	804
Write-Offs	0	0
Deaths	1	13
Service Retirement	<u>76</u>	<u>42</u>
At 6-30-76	949	14,262
<u>Partial Formula</u>		
At 6-30-75	13	534
From Active	2	9
Separation with Refund	3	34
Deaths	0	0
Service Retirement	<u>4</u>	<u>0</u>
At 6-30-76	8	509
<u>Total</u>		
Total at 6-30-75	1,054	15,455
Total at 6-30-76	957	14,937

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TABLE 4

ASSUMED RATES OF DECREMENT USED IN
VALUATION OF FORMULA PLAN BENEFITS

<u>Age</u>	<u>Death</u>	<u>Disability</u>	<u>Withdrawal</u>
20	.000530	.00076	.203
25	.000616	.00100	.168
30	.000758	.00112	.133
35	.000991	.00129	.098
40	.001374	.00164	.063
45	.002000	.00221	.028
50	.003580	.00347	.000
55	.006475	.00712	.000
60	.010436	.01264	.000

Assumed age at retirement - 62

Post Retirement Mortality - 1971 Group Annuity Mortality Table for males set back 6 years.

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TABLE 5

ASSETS AND CURRENT LIABILITIES

A. <u>Assets</u>	
Deposits in banks	\$ 413,652.86
Accounts Receivable:	
Accrued members' contributions	3,748,951.78
Accrued employer's contributions	11,613,342.06
Employer's social security receivable.	1,347,396.93
Minnesota Variable Annuity Fund.	38,806.89
Minnesota Adjustable Fixed Benefit	716,598.04
Proceeds from sale of investments.	1,161,809.48
Social Security Retirement Division.	827.85
Interest charges on late remittances	2,462.01
Other.	2,043.39
Accrued interest on investment.	4,057,522.44
Dividends on stock, declared but not yet received	70,774.29
Investment in bonds at amortized cost	189,863,047.01
Investment in common stocks at cost	181,180,303.06
Short term investments.	26,549,990.74
Deferred Yield Adjustment Account	4,761,445.30
Recognized unrealized appreciation in stocks.	3,491,788.51
Participation in Minnesota Adjustable Fixed Benefit Fund.	209,840,061.92
Participation in Minnesota Variable Annuity Fund.	28,756,818.56
Equipment at cost, less depreciation.	29,976.96
Total Assets	\$ <u>667,647,620.08</u>
 B. <u>Current Liabilities</u>	
Accounts Payable:	
Annuity payments	\$ 1,765,629.54
Accrued expenses	71,052.61
Other.	282.95
Total Current Liabilities.	<u>1,836,965.10</u>
 C. <u>Assets in Excess of Current Liabilities</u>	
	\$ <u>665,810,654.98</u>

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APPENDIX TO VALUATION REPORT

1. ACTUARIAL ANALYSIS OF CHANGE IN UNFUNDED LIABILITIES

As indicated in the report of actuarial valuation, during the current year the unfunded liability, excluding the deficit in the Adjustable Fixed Benefit Fund, increased by \$ 72,672,005. The causes of this increase may be summarized as follows:

Increases:

Actuarial loss - salary increases	\$51,371,595
Actuarial loss - terminations	12,363,954
Deficiency in contributions	5,724,751
Section 11.25 Subd. transfer	2,007,070
Cost of ancillary benefits	1,751,309

Decreases:

Actuarial gain - investment income	<u>546,674</u>
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Net Increase	\$72,672,005
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As required by Section 356.215 Subd. 4, in calculating the accrued prior service liability it is assumed that salaries increase each year at a rate of 3.5%. In the past year salaries actually increased at a rate of 9.17%. This departure from the assumed rate increased the deficit by \$51,371,595.

During the past year members terminated employment at a rate less than assumed in calculating the accrued prior service liability. The reserves released by these terminations were \$12,363,954 less than expected.

For purposes of this report it is assumed that minimum contributions are the sum of the entry age normal cost, 5% interest on the unfunded liability at the beginning of the year, and administrative expenses. Actual employee and employer contributions were \$5,724,751 less than this required amount.

Section 11.25 Subdivision 12 requires a transfer from the basic fund to the Adjustable Fixed Benefit Fund for the current year in the amount of \$2,007,070. This transfer is intended to reflect the mortality loss for retired members which actually amounted to \$ 376,397.

Ancillary benefits include disability, surviving spouses, surviving children, and 1915 law annuities in force. The cost of these benefits in the current year amounted to \$2,170,994. This is in part offset by \$419,685 interest forfeited when members received a refund of their deposits.

In computing required reserves it is assumed that investment income would be earned at the rate of 5% per annum. The actual income from investments exceeded the income required to maintain reserves on this basis by \$546,674.

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APPENDIX TO VALUATION REPORT

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2. ACTUARIAL ANALYSIS OF CHANGE IN ANNUITY STABILIZATION ACCOUNT

As indicated in the report of actuarial valuation, during the current year the annuity stabilization account, or deficit, in the Adjustable Fixed Benefit Fund increased by \$10,205,533. The cause of this increase may be summarized as follows:

Increases:

Deficiency in investment income	\$11,826,206
Mortality loss (retired lives)	376,397
Administration expense charge	10,000

Decreases

Section 11.25 Subd. 12 transfer	2,007,070
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Net Increase

	<u>\$10,205,533</u>
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In computing required reserves it is assumed that investment income would be earned at the rate of 5% per annum. The income required to maintain reserves on this basis exceeded the actual income from investments by \$11,826,206.

The difference between tabular and actual reserves released due to the death of annuitants amounting to \$376,397 represents the loss from mortality.

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Teachers Retirement Association
State of Minnesota

JUNE 30, 1976 FINANCIAL REPORT

A. Assets

Deposits in banks	\$ 413,652.86
Accounts Receivable:	
Accrued members' contributions	3,748,951.78
Accrued employer's contributions	11,613,342.06
Employer's social security receivable.	1,347,396.93
Minnesota Variable Annuity Fund.	38,806.89
Minnesota Adjustable Fixed Benefit Fund.	716,598.04
Proceeds from sale of investments.	1,161,809.48
Social Security Retirement Division.	827.85
Interest charges on late remittances	2,462.01
Other.	2,043.39
Accrued interest on investment.	4,057,522.44
Dividends on stock, declared but not yet received	70,774.29
Investment in bonds at amortized cost	189,863,047.01
Investment in common stocks at cost	181,180,303.06
Short term investments.	26,549,990.74
Deferred Yield Adjustment Account	4,761,445.30
Recognized unrealized appreciation in stocks.	3,491,788.51
Participation in Minnesota Adjustable Fixed Benefit Fund.	209,840,061.92
Participation in Minnesota Variable Annuity Fund.	28,756,818.56
Equipment at cost, less depreciation.	29,976.96
Total Assets.	\$ <u>667,647,620.08</u>

B. <u>Unfunded Accrued Liability</u>	\$ <u>627,953,515.82</u>
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C. Accumulated Members' Contributions Without Interest

Regular TRA	\$ 188,432,358.40
Variable Annuity Fund (includes Earnings)	<u>14,295,889.71</u>
Total	\$ <u>202,728,248.11</u>

D. Current Liabilities

Accounts Payable:	
Annuity payments	\$ 1,765,629.54
Accrued expenses	71,052.61
Other	282.95
Total Current Liabilities	\$ <u>1,836,965.10</u>

E. Total Reserves Required as Per Attached Schedule.	<u>\$1,293,764,170.80</u>
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SCHEDULE OF TOTAL RESERVES REQUIRED JUNE 30, 1976

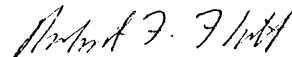
1. <u>For Adjustable Fixed Benefit Fund Participants</u>	\$ 239,670,297.19
2. <u>For Variable Annuity Fund Participants</u>	28,756,818.56
3. <u>For Active Members</u>	962,996,223.00
4. <u>For Inactive Members</u>	54,726,447.00
5. <u>For Other Annuitants</u>	
a. 1915 Law Retirement Annuities	117,750.52
b. Disability Annuities	5,755,822.00
c. Widow's Annuities	1,577,470.41
d. Surviving Children's Annuities	<u>163,342.12</u>
Total	\$ <u>7,614,385.05</u>
Total Required Reserves	\$ 1,293,764,170.80

Certification

The above exhibit has been prepared in accordance with the provisions of Section 356.20. The required reserves for formula benefits have been computed in accordance with the entry age normal cost method.

Respectfully submitted,

BROWN AND FLOTT


Robert F. Flott

November 30, 1976