Annual Actuarial Valuation December 31, 1986

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May 22, 1987

Board of Trustees St. Paul Police Relief Association St. Paul, Minnesota

Submitted in this report are the results of the December 31, 1986 actuarial valuation of the assets, actuarial values and contribution requirements associated with the benefits provided by the St. Paul Police Relief Association.

The valuation results contained in Section A provide the actuarial information needed to determine the employer's "minimum obligation" effective January 1, 1988. Section A also contains comments regarding the valuation results.

The valuation was based upon information furnished by the Association concerning benefits, financial transactions, active members, terminated members, retirants and beneficiaries. Data was checked for year to year consistency but was not otherwise audited by us. This information is summarized in Section B.

A description of the actuarial funding method and the risk experience assumptions used is contained in Section C. The economic risk experience assumptions, as well as the actuarial funding method to be used, are established by state law.

Information needed to comply with Statement No. 5 of the Governmental Accounting Standards Board is contained in Section D.

The actuarial valuation was prepared using generally accepted actuarial principles and practices based upon the methods, assumptions, summary of plan provisions and the member and financial data described in this report.

Respectfully submitted, red 2/ Amite Many ome

Section A

Valuation Results

#### COMMENTS

#### Economic Assumptions and Financing Method

The economic assumptions of 5% annual investment return and 3-1/2% annual salary increases are established by state law. State law also specifies that the annual minimum obligation of the municipality shall be determined by adding (i) the employer normal cost percent times covered payroll to (ii) the level dollar amount required to amortize the unfunded actuarial accrued liability by December 31, 2010.

It is worth noting that when the same assumptions and methods are applied to plans which differ in nature, the valuation results may not be comparable. Caution should be exercised when attempting to assess the financial condition of one Association relative to another on the basis of valuation results produced using the assumptions and methods mandated by state law.

#### Determing Actuarial Value of Assets

In 1984, a state law was enacted which prescribes the method to be used in determining the value of assets for purposes of an actuarial valuation. Specifically, the law states that the actuarial value of assets will be the book value plus onethird of the amount derived by subtracting book value from market value. However, the book value of investments was not readily available. Therefore, market value of investment adjusted for receivable and payable amounts was used as the actuarial value of assets. This resulted in a lower unfunded liability and lower amortization payment than would have been the case had we been able to determine valuation assets in accordance with State law.

## CONTRIBUTION RATE TO PROVIDE BENEFITS

# Member portion & Employer portion Effective January 1, 1988

	If Paid Equally	Thro	oughout Year
Contributions for	Normal Cost % of Active <u>Payroll for 1988</u>	+	UAAL Dollars \$4,188,901
Normal cost of annutcles:			
Age & service: to members Age & service: to survivors Disability Death before retirement Refunds of member contributions Total Normal Cost	15.97% 2.45 2.30 1.59 <u>0.00</u> 22.31%		
Amortization of unfunded actuarial accrued liabilities (UAAL) (23 year level dollar payment)			
Retired lives Active members Total			\$0 <u>4,188,901</u> 4,188,901
Total Cost of Benefits	22.31%	+	\$4,188,901
Member contributions	8.00%		
COMPUTED EMPLOYER RATE:			
<ul><li>(a) If Paid Equally Throughout Year</li><li>(b) IF PAID AT CALENDAR YEAR END</li></ul>	14.31% 14.66%	+ +	\$4,188,901 \$4,292,346

# St. Paul Police Relief Association Present Actuarial Condition

The Association's accrued actuarial assets were in excess of \$74.7 million on December 31, 1986 -- a considerable sum of money if unencumbered and allocated among a small group of persons. This is not the case with the Association's assets.

The following schedule puts the \$74.7 million into perspective by showing the relationship between accrued actuarial assets, actuarial accrued liabilities, and the number of persons with actual and potential claims on the Association's assets.

	Accrued Actuarial Assets	Actuarial Accrued Liabilities	Unfunded Actuarial Accrued Liabilities	% Funded
Retirants and Beneficiaries Retired Members (253) Surviving Spouses (156) Surviving Children (21)		\$ 56,492,952 11,959,392 186,192		
Total (430)	\$68,638,536	\$ 68,638,536	\$ 0	100.0%
Deferred Memb <mark>e</mark> rs (3)	749,112	749,112	0	100.0%
Active Members (443)	5,408,491	63,311,866	57,903,375	8.5%
Total	\$74,796,139	\$132,699,514	\$57,903,375	56.4%

Actuarial accrued liabilities represent the value, computed as of December 31, 1986 of:

- (i) retirement allowances likely to be paid the 430 retirants and beneficiaries; and
- (ii) the contributions assumed to have been made for the 443 active members from entry into the plan until December 31, 1986.

The value of retirement allowances likely to be paid the 430 retirants and beneficiaries, discounted for investment earnings and mortality, was computed to be \$68,638,536 as of December 31, 1986. To put this amount in perspective, the \$68,638,536, together with investment earnings, will just be sufficient to pay the 430 retirants and beneficiaries their allowances for their remaining lifetimes. This assumes the 430 retirants and beneficiaries live and die according to the assumed mortality and the \$68,638,536 is invested to yield an average annual return of 5.0% over the remaining lifetimes of the retirants and beneficiaries.

With respect to the active members, the actuarial accrued liability of \$63,311,866 represents the amount that would have been accumulated by December 31, 1986. This assumes the normal cost (which is expressed as a level percentage of pay) had been contributed from the date of hire until December 31, 1986 for the 443 actives, and that these amounts had earned 5.0% interest. It also assumes that the members in the past had lived, died, withdrawn, retired and received salary increases according to the actuarial assumptions shown in this report.

Valuation Date December 31	Actuarial Accrued Liabilities	Accrued Actuarial Assets	Percent Funded
1978	\$ 69,904	\$15,427	22.1%
1979	74,796	19,100	25.5
1980	86,383	23,976	27.8
1981	94,351	28,245	29.9
1982	102,940	37,954	36.9
1983	109,366	44,614	40.8
1983*	117,502	44,614	38.0
1984	121,721	50,828	41.8
1985	126,461	65,093	51.5
1986	132,699	74,796	56.4

Historical Funding Ratio Schedule (\$ in thousands)

After change in assumptions.

Computed Contributions - Comparative Schedule

Year En Decembe Valuation	ded er 31 Fiscal	Total Normal Cost as a Percent of Valuation Payroll*	Contribution For Unfunded Actuarial Accrued Liabilities \$ or %
1978	1980	19.05%	\$2,618,688
1979	1981	19.71	3,535,558
1980	1982	20.97	4,021,978
1981	1983	20.58	4,329,836
1982	1984	20.53	4,330,611
1983	1985	20.51	4,395,456
1983	1985**	22.88	4,947,768
1984	1986	22.82	4,908,311
1985	1987	22.34	4,339,786
1986	1988	22.31	4,188,901

\* Includes employee contributions.

\*\* After change in assumptions.

# St. Paul Police Relief Association CONTRIBUTION FOR CALENDAR YEAR EFFECTIVE JANUARY 1, 1988

For any period of time the percent-of-payroll contribution rate is converted to dollars. The amount of dollars for any calendar year depends upon the results of the last actuarial valuation, and the timing of contributions within the year. The later the contribution date, the greater the dollar amount will be.

The municipality's dollar contribution for the year may be determined as follows:

(1)	Estimated covered payroll for 1988	\$	
(2)	Total normal cost % from page A-2	22.31%	
(3)	Total normal cost (Line 1 times line 2)		\$
(4)	Amortization payment on UAAL from page A-2		4,188,901
(5)	Total contributions required (Line 3 plus line 4)		
(6)	Employee contributions (Line 1 times 8%)	\$	
(7)	<ul> <li>(a) State amortization aid based on 12/31/78 UAAL of \$53,307,132</li> <li>(b) State amortization aid based on 1984 legislation</li> <li>(c) Total State amortization aid</li> </ul>	\$924,969	
(8)	Estimated insurance premium aid		
(9)	Estimated total contributions from other sources (Line 6 plus line 7 plus line 8)		
(10)	Employer's Minimum Obligation if payment is made in equal installments throughout the year (Line 5 minus line 9)		\$
(11)	EMPLOYER'S MINIMUM OBLIGATION IF PAYMENT IS MADE IN TWO EQUAL INSTALLMENTS, JULY 30, DEC. 30		\$

# Section B

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Valuation Data and Summary of Benefit Provisions

# Retirants and Beneficiaries December 31, 1986

By Type of Annuity Being Paid

Type of Annuity Being Paid	<u>No.</u>	Monthly Amounts	Computed Actuarial Accrued Liabilities
Retirants receiving: Age & Service Disability	242 	\$326,542.50 _11,674.41	\$53,996,400 _2,496,552
Totals	253	338,216.91	56,492,952
Beneficiaries receiving: Spouse Child	156 21	87,139.10 2,932.57	11,959,392 
Totals	177	90,071.67	12,145,584
Totals	430	\$428,288.58	\$68,638,536



Monthly Amount Paid by Benefit

# Inactive Members Eligible for Deferred Benefits

Computed Actuarial Monthly Accrued <u>No. Amount Liabilities</u> 3 \$3,463.22 \$749,112

December 31, 1986

Retirants and Beneficiaries December 31, 1986

By Attained Ages

		Number	
Attained Ages	Age & Service	Disability	Death Before Retirement
Under 20	1		17
20-24 35-39		2 1	1 1
40-44 45-49 50-54 55-59	1 11 45	2 1 4	4 2 3 6
60-64 65-69 70-74 75-79	80 51 54 47	2 3 1	8 7 6
80-84 85-89 90-94 95-99	30 19 7 2	2	2 5 2
Totals	348	18	64

Retirants and Beneficiaries Added to and Removed from Rolls

Valuation Date December 31	No. Added to Rolls	No. Removed from Rolls	<u>Rolls</u> No.	s End of Year Annual Allowances	Discounted Value of Total Allowances
1978			353	\$2,335,851	\$33,331,310
1979	39	17	375	2,877,664	37,813,231
1980	25	17	383	3,199,618	42,275,799
1981	33	13	403	3,583,534	47,522,366
1982	40	12	431	4,248,283	56,763,432
1983	28	23	436	4,475,940	63,716,560
1984	20	23	433	4,670,886	64,107,551
1985	11	19	425	4,825,712	64,862,316
1986	25	20	430	5,139,463	68,638,536

Comparative Statement





Active Members December 31, 1986

### By Attained Age and Years of Service

									Totals
Attained Age	0-4	Years 5-9	of Serv 10-14	ice to 15-19	Valuati 20-24	on Date 25-29 :	30 Plus	No.	Valuation Payroll
25-29 30-34 35-39		9 49 35	5 37	35				9 54 107	\$ 301,635 1,809,810 3,586,105
40-44 45-49 50-54 55-59		6 3	30 8	74 33 2 2	4 41 10 2	4 13 6	5 7	114 89 30 17	3,820,710 2,982,835 1,005,450 569,755
60 61 62 63 64					1	1	3 2 8 2 2	4 3 2 2	134,060 100,545 268,120 67,030 67,030
66 67							2	2 2	67,030 67,030
Totals		102	80	146	58	24	33	443	\$14,847,145

While not used in the financial computations, the following group averages are computed and shown because of their general interest.

Age: 42.6 years.

Service: 17.0 years.

Annual Pay: \$33,515.

# Comparative Schedule

### Of Active Members

Valuation Date		Valuation		Averag	e	
December 31	Active Members	Payroll	Age	Service	Pay	% Incr.
1978	554	\$11,487,744	39.5 yrs.	13.4 yrs.	\$20,736	- %
1979	550	12,295,800	38.8	13.4	22,356	7.8
1980	550	13,153,800	39.4	13.4	23,916	7.0
1981	527	13,552,332	39.9	14.1	25,716	7.5
1982	491	13,575,168	39.7	14.0	27,648	7.5
1983	480	14,065,920	40.3	14.7	29,304	6.0
1984	467	14,335,032	41.2	15.5	30,696	4.8
1985	464	14,881,408	42.0	16.4	32,072	4.5
1986	443	14,847,145	42.6	17.0	33,515	4.5

Valuation Payroll



Brief Summary (12/31/86) of Benefit Provisions Evaluated and/or Considered

#### Age & Service Retirement

Eligibility. 20 years of service and 50 years of age.

<u>Amount</u>. For first 20 years of service, 40/100 of base pay. For each year in excess of 20, an additional 2/100 is added to a maximum of 50/100 of base pay for 25 or more years of service. For each year over 25, an additional 1/2% of base pay is added to the benefit. (The latter additional benefit is not subject to the post-retirement adjustment provisions).

Pay Used For Plan Purposes. "Base pay" means the salary of patrolman.

#### Disability Retirement

<u>Eligibility</u>. Permanently disabled to the extent that no longer able to perform the duties of a police officer before being eligible for regular retirement.

#### Amount.

Duty Disability. 40/100 of base pay.

<u>Non-Duty Disability</u>. 10 years of service required. For first 10 years, 20/100 of base pay. For each year in excess of 10 an additional 2/100 is added up to a maximum of 40/100 of 20 years of service.

For either duty or non-duty, the benefit will be recomputed at age 50 if actual service would result in a benefit greater than 40/100 of base pay.

## Member's Death While Active, Or In Deferred Status, Or Retired

#### Eligibility.

<u>Spouse</u>. Legally married to member at least one year at time of separation from service and residing with member at time of death. Benefits terminate upon remarriage.

Child. Younger than age 18 or, if full-time student, younger than 23.

Amount.

Spouse. 20/100 of base pay.

Child. 5/100 of base pay per child.

<u>Vested Deferred</u>. 20 years of service and separated before age 50. Payment beginning is deferred to attainment of age 50.

<u>Post-Retirement Adjustments ("Escalator")</u>. Each time base pay is changed, payments to all benefit recipients are simultaneously changed by the same percent that base pay is changed.

Member Contributions. 8% of base pay. Non-refundable.

Section C

Valuation Methods and Assumptions

Valuation Methods and Assumptions

The Entry Age Normal Cost method was used to determine the normal cost of all benefits. The rate of investment return (interest) as required by state law used in making the valuation was 5.0 percent per annum, compounded annually. Age & service retirement was assumed to occur at age 58, or attained age if older.

#### Mortality Table\*

	Prov	Single Lit	fe Values:	- hlv		
Sample Ages	For L Men	Level For Life Men Women		asing (early Women	Future Expectanc Men	e Life cy (Years) <u>Women</u>
45	\$177.21	\$189.58	\$280.82	\$314.75	29.50	34.00
50	163.12	177.21	246.55	280.82	25.20	29.50
55	147.50	163.12	212.60	246.55	21.16	25.20
60	130.52	147.50	179.49	212.60	17.42	21.16
65	112.87	130.52	148.28	179.49	14.05	17.42
70	95.20	112.87	119.70	148.28	11.09	14.05
75	77.77	95.20	93.83	119.70	8.52	11.09
80	61.71	77.77	71.69	93.83	6.39	8.52

\* UP-1984 Table set forward 2 years for males and set back 3 years for females.

Sample Rates of Separation from Active Employment

Before Retirement, Death or Disability

Sample	% of Active Members
Ages	Separating within Next Year
20	1.50%
25	1.25
30	1.00
35	0.75
40	0.50
45	0.25
50+	0.00

Sample Ages	Present Pay Resulting in Pay of \$1,000 at Age 60	Present Increase in Pay During Next Year
20 25 30 35 40	\$ 253 300 356 423 503	3.5% 3.5 3.5 3.5 3.5 3.5
45 50 55 60	597 709 842 1,000	3.5 3.5 3.5 3.5

Pay Adjustment Factor Used To Project Current Pays

Use of the pay adjustment factor illustrated above is required by state law.

## Anticipated Disability Retirements

Sample	% of Active Members Becoming
Ages	Disabled_within_Next_Year
20 25 30 35 40	0.08% 0.08 0.08 0.08 0.08 0.20
45	0.26
50	0.49
55	0.89

# Section D

The Pension Benefit Obligation and Certain Other Disclosures Required by Statement No. 5 of the Governmental Accounting Standards Board

#### PENSION BENEFIT OBLIGATION

The amount shown below as the "pension benefit obligation" is a standardized disclosure measure of the present value of pension benefits, adjusted for the effects of projected salary increases, estimated to be payable in the future as a result of employee service to date. The measure is the actuarial present value of credited projected benefits and is intended to (i) help users assess the plan's funding status on a going-concern basis, (ii) assess progress being made in accumulating sufficient assets to pay benefits when due, and (iii) allow for comparisons among public employee retirement plans. The measure is independent of the actuarial funding method used to determine contributions to the plan.

The pension benefit obligation was determined as part of an actuarial valuation of the plan as of December 31, 1986. Significant actuarial assumptions used in determining the pension benefit obligation include (a) a rate of return on the investment of present and future assets of 5.0% per year compounded annually, (b) projected salary increases of 3.5% per year compounded annually, attributable to inflation, and (c) the assumption that benefits will increase 3.5% per year after retirement.

At December 31, 1986, the unfunded pension benefit obligation was \$53,041,723, determined as follows:

Pension Benefit Obligation:

Retirees and beneficiaries currently receiving benefits and terminated employees not yet receiving benefits	\$ 69,387,648
Current employees	
Accumulated employee contributions including allocated investment income	0
Employer financed	58,450,214
Total Pension Benefit Obligation	\$127,837,862
Net assets available for benefits, at cost (market value was \$74,796,139)	74,796,139
Unfunded Pension Benefit Obligation	\$ 53,041,723

# Appendices

#### APPENDIX I

#### FINANCIAL PRINCIPLES AND OPERATIONAL TECHNIQUES

<u>Promises Made, and Eventually Paid</u>. As each year is completed, the plan in effect hands an "IOU" to each member then acquiring a year of service credit -- the "IOU" says: "The Pension Plan owes you a portion of your retirement benefits, payments to be made in cash, commencing when you qualify for retirement."

The related key financial questions are: Which generation of taxpayers contributes the money to cover the IOU? The present taxpayers, who receive the benefit of the member's present year of service? Or the future taxpayers, who happen to be in town paying taxes at the later time when the IOU becomes a cash demand?

A sound principle of sound retirement plan financing is to have this year's taxpayers contribute the money to cover the IOUs being handed out this year. By following this principle, THE CONTRIBUTION RATE WILL REMAIN APPROXIMATELY LEVEL FROM GENERATION TO GENERATION -- our children and grandchildren will contribute the same percents of active payroll we contribute now.

#### A PENSION PLAN BECOMES CLOSED

The diagram in this appendix shows two important activities which occur after a plan has been closed to employees hired in the future.

Cash benefits paid continue to increase for decades, while active member payroll begins to decrease to zero. <u>Funding Method</u>. A funding method is the long-term, planned pattern for employer contributions.

For an open plan (a plan covering future employees), the level-percent-ofactive-member payroll funding method is the basic funding method.

The level-percent funding method can also be applied to a closed plan. However, the resulting contribution percent usually jumps to a high rate, because the number of covered active members is decreasing.

A preferred funding method for a closed plan consists of: level-percent funding for normal cost (the cost of members' service now being rendered); plus a level dollar contribution for unfunded actuarial accrued liabilities over a limited period of years. The period of years must be limited so that plan assets don't become zero while benefits are still payable.

<u>Computing Contributions To Support Plan Benefits</u>. From a given schedule of benefits and from the employee data and asset data furnished him, the actuary determines the contribution rates to support the benefits by means of an actuarial valuation and a funding method.

In making an actuarial valuation, assumptions must be made regarding anticipated financial experiences for the next year and for decades in the future. Only the subsequent actual experience of the plan can indicate the degree of accuracy of the assumptions.

<u>Reconciling Differences Between Assumed Experience and Actual Experience</u>. Once actual experience has occurred and been observed, it will not coincide exactly with assumed experience, regardless of the wisdom of the assumptions or the skill of the actuary and the millions of calculations he made. The future can be predicted with considerable but not 100% precision, except for inflation which seems to defy reliable prediction.

A well-managed plan copes with these continually changing differences by having periodic actuarial valuations. Each actuarial valuation is a complete recalculation of assumed future experience, taking into account all past differences between assumed and actual experience. The result is continuing adjustment in financial position.

# **A CLOSED PENSION PLAN**



# **YEARS OF TIME**

<u>A plan becomes closed</u> when no new hires are admitted to active membership. The persons covered by the plan at the time of closing continue their normal activities and continue to be covered by the plan, until the last survivor dies.

CASH BENEFITS LINE. After a pension plan becomes closed, the usual pattern is for cash benefits to continue to increase for decades of time. Eventually the cash benefits will peak, and then gradually decrease over more decades of time, ultimately to zero. The last cash benefit is likely to occur a century after the time the plan is closed.

The precise amounts of cash benefits cannot be known now, and must be estimated by assumptions of future experiences in a variety of financial risk areas.

#### APPENDIX II

#### MEANING OF UNFUNDED ACCRUED LIABILITIES

Almost every pension plan (public or private) has "unfunded accrued liabilities", so whatever they are, they aren't rare. Since the term is not part of everyday conversation, it needs some definition.

"Accrued liabilities" are the present value \$ of plan promises to pay benefits in the future based upon service already rendered - - - a liability has been established ("accrued") because the service has been rendered, but the resulting monthly cash benefit may not be payable until years in the future. Accrued liabilities \$ are the result of complex mathematical calculations, which are made by the plan's actuary (which is the name given to the specialist who makes such calculations).

If "accrued liabilities" at any time exceed the plan's accrued assets (cash & investments), the difference is "unfunded accrued liabilities". This is the common condition. If the plan's assets equalled the plan's "accrued liabilities", the plan would be termed "fully funded". This is a rare condition.

Each time a plan adds a new benefit which applies to service already rendered, an "accrued liability" is created, which is also an "unfunded accrued liability" because the plan can't print instant cash to cover the accrued liability. Payment for such unfunded accrued liabilities is spread over a period of years, commonly in the 20-40 year range. Unfunded accrued liabilities can occur in another way: If actual financial experience is less favorable than assumed financial experience, the difference is added to unfunded accrued liabilities. In plans where plan benefits are directly related to an employee's pay near time of retirement (a common plan provision) rather than his average pay throughout his working career, unfunded accrued liabilities have been increasing in recent years because unexpected rates of pay increase have created additional accrued liabilities which could not be matched by reasonable investment results. Some of these unexpected pay increases are the direct result of inflation, which is a very destructive force on financial stability.

The existence of unfunded accrued liabilities is not bad, then (any more than a mortgage on your house is "bad"), but the changes from year to year in amount of unfunded accrued liabilities are important - - - "bad" or "good" or somewhere in between.

Nor are unfunded accrued liabilities a bill payable immediately (your food costs are payable immediately), but it is important that policy-makers prevent the amount from becoming unreasonably high and it is vital that your plan have a sound method for making payments toward them so that they are controlled.

The existence of large amounts of unfunded accrued liabilities indicates that total contributions in past years were less than level - - - an almost certain history if retired life liabilities are not fully funded now.