November 13, 1973

INTRODUCTION

Name of Association Minnesota Highway Patrol Officers' Retirement Association

In accordance with Chapter 359 of the 1965 Minnesota Laws, Chapter 249 of the 1967 Minnesota Laws, and Chapter 289 of the 1969 Minnesota Laws, an actuarial valuation as of June 30, 1973 has been made of this retirement association. The valuation covers the membership of the fund as shown in the census of members and survivors of deceased members, which is included in this report. The details of the benefits under the plan, assets in the fund, income of the fund, and membership data were furnished by the Association.

This report covers the following items:

A. Benefits of the Plan and Contributions.

B. Assumptions in Actuarial Valuation.

C. Results of Valuation.

D. Discussion of Results.

E. Analysis of Change in the Unfunded Accrued Liability.

F. Census of Membership and Benefits as of June 30, 1973.

G. Analysis of Changes in Membership.

H. Average Ages at Entry and Retirement.

I. Certification by Actuary.

MINNESOTA HIGHWAY PATROL OFFICERS' RETIREMENT FUND

A. BENEFITS OF PLAN AND CONTRIBUTIONS

This plan provides the following major benefits:

1. Retirement Benefit.

   a. Requirements for retirement:

      (1) Age 55 and 10 years of service required for full service benefit.

      (2) 10 years of service required for vesting of deferred annuity benefit with payments to start at age 55.

   b. Monthly Annuity:

      2 1/2% of average monthly salary for each year up to and including 20 years; 2% for each year of service in excess of 20.

   c. Average Monthly Salary:

      Average of highest 5 years.

2. Disability Benefit.

   a. Requirements:

In Line of Duty:	None.
Not in Line of Duty:	5 years of service and age less than 55.

   b. Monthly Annuity:

In Line of Duty:	50% of average monthly salary plus 2% for each year of service in excess of 20.
Not in Line of Duty:	2 1/2% of average monthly salary for each year up to and including 20 years plus 2% for each year in excess of 20; a minimum of 25%.

3. <u>Widow's and Orphans's Benefits.</u>

a. Active Members:

(1) Death benefit before retirement:

Widow: 20% of average covered monthly salary.

Orphans: 10% of average covered monthly salary to age 18 or 22 for each child plus $20 per month prorated equally to such children.

(Maximum total orphan benefit $400 per month.)

(2) Death benefit after retirement:

None (actuarial equivalent of life annuity may be chosen under an option to provide a widow's benefit). However, the widows of those members who retired or separated from the fund with vested benefits prior to July 1, 1965 will receive $125 per month.

b. Retired Members: None.

4. <u>Other Death Benefit</u> (lump sum): None.

5. <u>Termination of Employment Benefit</u>:

Automatic refund without interest if less than 10 years of service. Must be requested if 10 years or more of service - otherwise vested with the benefit at age 55. No refunds after 20 years of service.

6. <u>Contributions</u>:

Member:	8.0% of salary
Employer Regular:	12.0% of salary
Employer Additional:	10.0% of salary
Total	30.0% of salary

B. ASSUMPTIONS IN ACTUARIAL VALUATION

1.	Mortality:	United States Life Tables, 1959-61 (White Males and White Females). These tables were used for both active and retired members, and for survivors.
2.	Disability:	The rates of disability were adapted from experience of the New York State Employees' Retirement System, graduated and extrapolated as required for this valuation.
3.	Withdrawal:	A rate of withdrawal of .030 at age 20 decreasing uniformly to zero at age 50 with no withdrawals after that age.
4.	Salary Scale:	Salaries were assumed to increase 3 1/2% each year.
5.	Retirement Age:	The assumed average ages at retirement for this fund were 57.0 for the Highway Patrol group and 62.5 for the State Police Officers group.
6.	Interest:	5%, compounded annually.

It is felt that these assumptions are appropriate for the valuation of this fund on a realistic basis.

C. RESULTS OF VALUATION

1. Valuation.

Normal Cost of Benefits	$ 1,295,780
Administrative Expense	16,000
Accrued Liability	32,706,692

2. Current Deficit from Full Funding.

Accrued Liability	$ 32,706,692
Assets in Fund *	16,132,905
Unfunded Accrued Liability	$ 16,573,787

3. Annual Payment to Achieve Full Funding by 1997.

Annual Deposit to Retire Deficit by 1997	$ 1,143,922
Total Normal Cost	1,295,780
Administrative Expense	16,000
Total Annual Payment	$ 2,455,702

4. Minimum Contribution to Prevent Increase in Deficit.

Interest on Deficit at 5%	$ 828,689
Total Normal Cost	1,295,780
Administrative Expense	16,000
Minimum Contribution	$ 2,140,469

5. Income of Fund during Fiscal Year Ending June 30, 1973*

Members' Contributions	$ 616,700
Taxes or Public Funds	1,692,005
Total Contributions	$ 2,308,705
Investment Income	$ 504,468

6. Annual Payroll. *

Total Projected Payroll, 1973-1974	$ 9,036,012

* Data furnished by Association. For valuation purposes, assets from Minnesota Adjustable Fixed Benefit Fund taken equal to reserves for benefits payable from this Fund at the July 1, 1973 level.

D. DISCUSSION OF RESULTS

The valuation was made by a method known as the entry age normal cost method. Under this method, the normal cost is determined based on the age at hire of each member. This normal cost is the annual deposit required (using the assumptions outlined in Section B above) to pay for the cost of each member's prospective benefits over a period from his date of hire to his date of retirement. This normal cost is determined as a level percentage of payroll; therefore, future increases in payroll will produce increases in the number of dollars of normal cost.

The elements of normal cost for this plan are:

Type of Benefit	Normal Cost
Service Retirement Benefit	$ 802,123
Disability Benefit	257,466
Withdrawal Benefit	3,632
Survivor's Benefit	175,345
Vesting	57,214
Total Normal Cost	$ 1,295,780

This total normal cost and the administrative expense equal 14.52% of the total payroll as of June 30, 1973.

When a retirement plan is fully funded, the fund contains an amount equal to the accumulation (under the actuarial assumptions made) of the normal cost for each member from his date of hire to the date of the valuation. This accumulation is called the accrued liability or the required reserve.

The elements of accrued liability for this plan are:

Type of Benefit	Accrued Liability
1. Active Members	
Retirement Benefit	$ 22,127,505
Disability Benefit	2,148,264
Withdrawal Benefit	21,124
Survivor's Benefit	1,634,634
Vesting	654,753
Total for Active Members	$ 26,586,280
2. Inactive Members	
Retired	$ 3,874,762
Disabled	106,958
Deferred Retired	252,486
Widows	1,029,346
Orphans	105,340
Survivor's Benefit	751,520
Total for Inactive Members	$ 6,120,412
Total Accrued Liability	$ 32,706,692

A retirement plan which is fully funded requires future contributions no larger than the sum of the administrative expense and the normal costs for all active members to pay for the prospective benefits (if the assumptions made are realized exactly). To the extent that normal costs and administrative expenses have not been paid in the past, a plan is not fully funded. The amount by which the plan is short of full funding is called the unfunded accrued liability of the fund. In other words, the unfunded accrued liability is the excess of the accrued liability over the actual assets of the fund.

The amount of annual contribution which would be required to pay each year's normal cost, to pay the administrative expense and to eliminate the deficit by 1997 is the "total annual payment" shown in Section C of this report.

The deficit in the fund will increase unless at least 5% interest on the deficit is paid each year in addition to the normal cost and the administrative expenses. The sum of these three amounts should be regarded as the minimum annual contribution to the fund in order to keep the deficit at its present size. This "minimum contribution" is shown in Section C of this report.

E. ANALYSIS OF CHANGE IN THE UNFUNDED ACCRUED LIABILITY

As of 6-30-72		
Accrued Liability	$ 23,540,541	
Assets	13,121,325	
Unfunded Accrued Liability		$ 10,419,216
As of 6-30-73		
Accrued Liability	$ 32,706,692	
Assets	16,132,905	
Unfunded Accrued Liability		16,573,787
Increase in Unfunded Accrued Liability		$ 6,154,571
Increases:		
Change in Benefits	$ 12,535,570	
Salary Scale Loss	1,682,198	
Mortality and Termination Loss	33,525	
		$ 14,251,293
Decreases:		
Change in Assumed Interest Rate	$ 6,908,763	
Amortization Contribution	978,038	
Excess Interest	197,050	
Capital Gain	12,871	
		8,096,722
		$ 6,154,571

F. CENSUS OF MEMBERSHIP AND BENEFITS AS OF JUNE 30, 1973

Status	Number	Annual Payroll
Active Members	735	$ 9,036,012

Status	Number	Annual Benefit
Service Retirements	129	$ 419,058
Disability Retirements	2	7,606
Widow Annuitants	54	90,262
Orphan Annuitants	29	21,931

Status	Number	Annual Benefit
Deferred Annuitants	14	$ 33,298

G. ANALYSIS OF CHANGES IN MEMBERSHIP

	Highway Patrol	State Police Officers
Active Members		
Number as of 6-30-72	495	228
New Entrants	18	15
Transfers from Deferred	1	0
Total	514	243
Deaths	0	0
Withdrawals with Vested Benefits	2	0
Withdrawals without Vested Benefits	5	8
Retired	3	3
Disabled	0	1
Total Terminations	10	12
Number as of 6-30-73	504	231
Service Retirements		
Number as of 6-30-72	84	42
Newly Retired	3	3
Transfer from Deferred Status	1	0
Transfer from Disabled Status	1	0
Total	89	45
Deaths	3	2
Number as of 6-30-73	86	43
Disabled Annuitants		
Number as of 6-30-72	2	0
Newly Disabled	0	1
Total	2	1
Transfer to Retired Status	1	0
Number as of 6-30-73	1	1

	Highway Patrol	State Police Officers
Widow Annuitants		
Number as of 6-30-72	29	26
Newly Widowed	2	0
Total	31	26
Deaths	0	1
Remarried	0	1
Number as of 6-30-73	31	24
Orphan Annuitants		
Number as of 6-30-72	27	6
Newly Orphaned	1	0
Total	28	6
Orphans Attaining Maximum Age	2	3
Number as of 6-30-73	26	3
Deferred Annuitants		
Number as of 6-30-72	8	6
New Deferred Annuitants	2	0
Total	10	6
Transfer to Retired Status	1	0
Transfer to Active Status	1	0
Deaths	0	0
Total Terminations	2	0
Number as of 6-30-73	8	6

H. AVERAGE AGES AT ENTRY AND RETIREMENT

		Highway Patrol	State Police Officers
The average age at which employment commences is as follows:			
All Current Members		26.9	30.8
New Entrants Fiscal Year	1968-1969	26.4	33.0
	1969-1970	26.0	30.2
	1970-1971	25.4	30.9
	1971-1972	25.0	27.6
	1972-1973	24.1	30.8
The average age at which service retirements have taken place is as follows:			
All Current Service Retirements		57.6	64.9
New Retireds Fiscal Year	1968-1969	56.7	65.0
	1969-1970	55.0	63.0
	1970-1971	58.9	59.0
	1971-1972	57.9	63.5
	1972-1973	57.2	62.7

I. CERTIFICATION BY ACTUARY

Name of Association Minnesota Highway Patrol Officers' Retirement Association

We hereby certify that this actuarial valuation of the above named Association was made as of June 30, 1973, on the basis of accepted actuarial methods and procedures. The survey was completed in accordance with the requirements of Chapter 359 of Minnesota Laws 1965, Chapter 249 of Minnesota Laws 1967 and Chapter 289 of Minnesota Laws 1969.

Franklin C. Smith

Franklin C. Smith
Associate, Society of Actuaries
GEORGE V. STENNES & ASSOCIATES

GVS Minnesota Memorandum No. 73-6
December 6, 1973

HIGHWAY PATROLMEN VALUATION AS OF JUNE 30, 1973

The purpose of this memorandum is to discuss the valuation report of the Minnesota Highway Patrol Officers Retirement Association which was submitted to the Commission in accordance with Chapter 249 of Minnesota Laws 1967 and Chapter 289 of Minnesota Laws 1969. The valuation was made by our office using the entry age normal cost method and assuming 5% interest. The Plan includes the State Police officers as well as the members of the Highway Patrol.

This memorandum contains the following:

1. Statistical and Valuation Data;
2. Discussion of Valuation Results;
3. Adjustments in Benefits
4. Conclusion.

1. Statistical and Valuation Data

Results of the valuation reports as of June 30, 1972 and June 30, 1973 are shown for comparative purposes. Figures are rounded where necessary for simplicity of presentation.

	June 30, 1972	June 30, 1973
(1) Membership		
Active Members	723	757
Deferred Annuitants	13	14
Retired Members	126	129
Disabled Members	2	2
Widows of Deceased Members	55	55
Children of Deceased Members	32	29
(2) Payroll and Annuities Payable	(Thousands of Dollars)	
Total Payroll	$ 7,621	$ 9,036
Annuities (annual)	465	539 *

* Prior to adjustment in benefits for retired participants and widows of 12.34% in July.

	June 30, 1972	June 30, 1973
(3) Valuation Balance Sheet	(Thousands of Dollars)	
Accrued Liability	$ 23,540	$ 32,707
Assets	13,121	16,133
Unfunded Accrued Liability (Deficit)	$ 10,419	$ 16,574
Funding Ratio (Assets/Accrued Liability)	55.7%	49.3%
(4) Normal Cost and Funding Costs	% of Payroll	% of Payroll
Normal Cost	13.65%	14.34%
Administrative Expense	0.14	0.18
Normal Cost plus Expense	13.79%	14.52%
Normal Cost plus Expense	13.79%	14.52%
Interest on Deficit	4.79	9.17
Total (Minimum Contribution)	18.58%	23.69%
Normal Cost plus Expense	13.79%	14.52%
Amortization by 1997	8.01	12.66
Total (Required Contribution)	21.80%	27.18%
(5) Statutory Contributions		
Employee	7.0%	8.0%
Employee Regular	11.2	12.0
Employer Additional	8.0	10.0
Total Contributions	26.2%	30.0%
(6) Investment Yield *	4.80%	5.42%

* Rate of return on mean assets excluding Minnesota Adjustable Fixed Benefit Fund.

2. Discussion of Valuation Results

All of the increases in cost shown above are the net result of an increase from the change to a benefit based on the highest five-year average compensation and a decrease from the change in the assumed interest rate from 3.5% to 5%.

The changes in cost have also been affected by the fact that prospective benefits for active participants are based on salaries which went into effect about the middle of July. The costs have been related to a payroll figure based on these same new salaries. In the 1972 valuation, the prospective benefits were based on salaries in effect on July 1 and related to total payroll during the prior year. This accounts for the abnormal increase in the payroll figure as well as the large salary scale loss appearing in a subsequent analysis.

In the cost calculations for the State Police Officers group, an average retirement age of 62.5 has been assumed. Although this appears to be conservative compared with the actual overall average of 64.9 and also with the average of the past 5 years of 62.6, new legislation relative to mandatory retirement ages will result in retirements at lower ages in the future. This will produce increases in the costs for the State Police Officers group.

The unfunded accrued liability increased from $10, 419, 216 to $16, 132, 905 during the year, an increase of $6, 154, 571. The following is an approximate analysis of this change:

Increases:		
Change in Benefits	$ 12, 535, 570	
Salary Scale Loss	1, 682, 198	
Mortality and Termination Loss	33, 525	
		$ 14, 251, 293
Decreases:		
Change in Assumed Interest Rate	$ 6, 908, 763	
Amortization Contribution	978, 038	
Excess Interest	197, 050	
Capital Gain	12, 871	
		8, 096, 722
		$ 6, 154, 571

3. Adjustments in Benefits

After the date of the valuation, benefits payable from the Minnesota Adjustable Fixed Benefit Fund were adjusted in July of 1973 by the ratio of the reserve on a 3 1/2% interest assumption to the reserve on a 5% interest assumption. This produced an increase of 12.34% for retired participants and widows who are now receiving payments and for any future survivors of such retired participants. As of January 1, 1974, these benefits will be increased by an additional 12.66% to make the total increase 25%.

The Minnesota Adjustable Fixed Benefit Fund allocated $6, 062, 075 to the Highway Patrol as of June 30, 1973. The reserve for the benefits after the 25% increase amounts to $6, 159, 052. Thus, a transfer of $96, 977 to the Adjustable Fund will be required to make up the difference.

When the effect of these changes is taken into account, the valuation summary appears as follows:

Accrued Liability	$ 33,264,810
Assets	16,594,046
Unfunded Accrued Liability	$ 16,670,764
Funding Ratio	49.8%

4. Conclusion

In our opinion, the statutory contributions for this plan are sufficient to pay the normal cost each year and to retire the deficit by 1997. This opinion is based upon cost figures obtained by the entry age normal cost method and upon the valuation assumptions. However, the margins which are shown on page 2 will decrease as the retirement ages of the State Police Officers group decrease.

Franklin C. Smith
Associate, Society of Actuaries
GEORGE V. STENNES AND ASSOCIATES
Commission Actuaries