November 15, 1972

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, 1972 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, 1972.

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

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 covered monthly salary plus 2% for each year of service in excess of 20.
Not in Line of Duty:	2 1/2% of average covered 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. Widow's and Orphan's Benefits.

a. Active Members:

(1) Death benefit before retirement:

Widow:	20% of average covered monthly salary.
Orphans:	8% of average covered monthly salary to age 18 for each child plus $20 per month prorated equally to such children.

(Maximum total orphan benefit $200 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 $75 per month.

b. Retired Members: None.

4. Other Death Benefit (lump sum): None.

5. Termination of Employment Benefit:

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. Contributions:

Member:	7.0% of salary
Employer Regular:	11.2% of salary
Employer Additional:	8.0% of salary
Total	26.2% 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:	3 1/2%, 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	$ 1,040,323
Administrative Expense	10,821
Accrued Liability	23,540,541

2. Current Deficit from Full Funding.

Accrued Liability	$ 23,540,541
Assets in Fund *	13,121,325
Unfunded Accrued Liability	$ 10,419,216

3. Annual Payment to Achieve Full Funding by 1997.

Annual Deposit to Retire Deficit by 1997	$ 610,774
Total Normal Cost	1,040,323
Administrative Expense	10,821
Total Annual Payment	$ 1,661,918

4. Minimum Contribution to Prevent Increase in Deficit.

Interest on Deficit at 3.5%	$ 364,672
Total Normal Cost	1,040,323
Administrative Expense	10,821
Minimum Contribution	$ 1,415,816

5. Income of Fund during Fiscal Year Ending June 30, 1972*

Members' Contributions	$ 549,618
Taxes or Public Funds	1,507,169
Total Contributions	$ 2,056,787
Investment Income	$ 374,713

6. Annual Payroll. *

Total Payroll as of 6-30-72	$ 7,621,027

* 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 1972 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	$ 697,781
Disability Benefit	165,003
Withdrawal Benefit	3,205
Survivor's Benefit	123,037
Vesting	51,297
Total Normal Cost	$ 1,040,323

This total normal cost and the administrative expense equal 13.79% of the total payroll as of June 30, 1972.

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	$ 15,458,870
Disability Benefit	1,327,640
Withdrawal Benefit	15,836
Survivor's Benefit	1,169,713
Vesting	520,422
Total for Active Members	$ 18,492,481
2. Inactive Members	
Retired	$ 3,368,767
Disabled	109,562
Deferred Retired	286,666
Widows	659,879
Orphans	74,709
Survivor's Benefit	548,477
Total for Inactive Members	$ 5,048,060
Total Accrued Liability	$ 23,540,541

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 3 1/2% 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 6-30-71		
Accrued Liability	$ 21,399,349	
Assets	10,993,892	
Unfunded Accrued Liability		$ 10,405,457
As of 6-30-72		
Accrued Liability	$ 23,540,541	
Assets	13,121,325	
Unfunded Accrued Liability		10,419,216
Increase in Unfunded Accrued Liability		$ 13,759
Increases:		
Change in Assumed Average Retirement Age	$ 714,113	
Salary Scale Loss	141,954	
Capital Loss	25,983	
		$ 882,050
Decreases:		
Amortization Contribution	$ 711,020	
Excess Interest	101,580	
Mortality and Termination Gain	55,691	
		868,291
		$ 13,759

F. CENSUS OF MEMBERSHIP AND BENEFITS AS OF JUNE 30, 1972

Status	Number	Annual Payroll
Active Members	723	$ 7,621,027

Status	Number	Annual Benefit
Service Retirements	126	$ 378,059
Disability Retirements	2	7,255
Widow Annuitants	55	64,821
Orphan Annuitants	32	15,060

Status	Number	Annual Benefit
Deferred Annuitants	13	$ 29,280

G. ANALYSIS OF CHANGES IN MEMBERSHIP

	Highway Patrol	State Police Officers
Active Members		
Number as of 6-30-71	503	211*
New Entrants	3	26
Transfers	0	1
Total	506	238
Deaths	2	0
Withdrawals with Vested Benefits	0	1
Withdrawals without Vested Benefits	2	7
Retired	5	2
Disabled	1	0
Transfers	1	0
Total Terminations	11	10
Number as of 6-30-72	495	228

*Includes 3 omitted from 1971 list.

	Highway Patrol	State Police Officers
Service Retirements		
Number as of 6-30-71	80	43
Newly Retired	5	2
Transfer from Deferred Status	2	0
Transfer from Disabled Status	0	0
Total	87	45
Deaths	3	3
Number as of 6-30-72	84	42
Disabled Annuitants		
Number as of 6-30-71	1	0
Newly Disabled	1	0
Total	2	0
Transfer to Retired Status	0	0
Number as of 6-30-72	2	0

	Highway Patrol	State Police Officers
Widow Annuitants		
Number as of 6-30-71	26	25
Newly Widowed	5	2
Total	31	27
Deaths	2	1
Number as of 6-30-72	29	26
Orphan Annuitants		
Number as of 6-30-71	25	7
Newly Orphaned	2	0
Total	27	7
Orphans Attaining Maximum Age	1	1
Number as of 6-30-72	26	6
Deferred Annuitants		
Number as of 6-30-71	9	5
New Deferred Annuitants	0	1
Total	9	6
Transfer to Retired Status	2	0
Refunds	0	0
Deaths	0	0
Total Terminations	2	0
Number as of 6-30-72	7	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	30.6
New Entrants Fiscal Year	1967-1968	25.9	N.A.
	1968-1969	26.4	33.0
	1969-1970	26.0	30.2
	1970-1971	25.4	30.9
	1971-1972	25.0	27.6
The average age at which service retirements have taken place is as follows:			
All Current Service Retirements		57.2	65.3
New Retireds Fiscal Year	1967-1968	60.5	69.0
	1968-1969	56.7	65.0
	1969-1970	55.0	63.0
	1970-1971	58.9	59.0
	1971-1972	57.9	63.5

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, 1972, 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. 72-5
November 17, 1972

HIGHWAY PATROLMEN VALUATION AS OF JUNE 30, 1972

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 3 1/2% 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. Conclusion.

1. Statistical and Valuation Data

Results of the valuation reports as of June 30, 1971 and June 30, 1972 are shown for comparative purposes. Figures are rounded where necessary for simplicity of presentation.

	June 30, 1971	June 30, 1972
(1) Membership		
Active Members	711	723
Deferred Annuitants	14	13
Retired Members	123	126
Disabled Members	1	2
Widows of Deceased Members	51	55
Children of Deceased Members	32	32
(2) Payroll and Annuities Payable	(Thousands of Dollars)	
Total Payroll	$ 7,331	$ 7,621
Annuities (annual)	425	465
(3) Valuation Balance Sheet	(Thousands of Dollars)	
Accrued Liability	$ 21,399	$ 23,540
Assets	10,994	13,121
Unfunded Accrued Liability (Deficit)	$ 10,405	$ 10,419
Funding Ratio (Assets/Accrued Liability)	51.4%	55.7%

(4) Normal Cost and Funding Costs

	June 30, 1971 % of Payroll	June 30, 1972 % of Payroll
Normal Cost	13.28%	13.65%
Administrative Expense	.09	0.14
Normal Cost plus Expense	13.37%	13.79%
Normal Cost plus Expense	13.37%	13.79%
Interest on Deficit	4.98	4.79
Total (Minimum Contribution)	18.35%	18.58%
Normal Cost plus Expense	13.37%	13.79%
Amortization by 1997	8.14	8.01
Total (Required Contribution)	21.51%	21.80%

(5) Statutory Contributions

Employee	7.0%	7.0%
Employee Regular	11.2	11.2
Employer Additional	8.0	8.0
Total Contributions	26.2%	26.2%

(6) Investment Yield *

	6.75%	4.80%

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

2. Discussion of Valuation Results

The normal cost as a percentage of payroll increased from 13.28% of payroll in 1971 to 13.65% in 1972. This was the result of a change in the assumed average age at retirement of the Highway Patrol group. If this change had not been made, the normal cost would have been 13.23%.

The change in the assumed average retirement age for the Highway Patrol group also added $714,113 to the deficit. If this change had not been made, the funding ratio would have been 57.5% rather than 55.7%. In spite of the larger deficit, the amortization contribution as a percentage declined from 8.14% of payroll to 8.01%.

In our review of the 1971 valuation, we pointed out that the rate of return on investments jumped from 4.14% in fiscal 1970 to 6.75% in fiscal 1971, and we surmised that an error in reporting accruals as of June 30, 1970 had occurred which caused some of 1970's income to be reported in 1971. The fact that the rate for fiscal 1972 is back to 4.80% supports this surmise.

The unfunded accrued liability increased from $10,405,457 to $10,419,216 during the year, an increase of $13,759. The following is an approximate analysis of this change:

Increases:		
Change in Assumed Average Retirement Age	$ 714,113	
Salary Scale Loss	141,954	
Capital Loss	25,983	
		$ 882,050
Decreases:		
Amortization Contribution	$ 711,020	
Excess Interest	101,580	
Mortality and Termination Gain	55,691	
		868,291
		$ 13,759

If the change in the assumed average retirement age had not been made, the unfunded accrued liability would have decreased by $700,354.

3. 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.

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