ACTUARIAL VALUATION REPORT

OF THE

MINNESOTA HIGHWAY PATROL OFFICERS'

RETIREMENT ASSOCIATION

AS OF

JUNE 30, 1977

Prepared and submitted by

Stennes & Associates, Inc.

Actuaries and Consultants

November 30, 1977

INTRODUCTION

Minnesota Highway Patrol Officers' Retirement Association

In accordance with the pertinent chapters of Minnesota Laws, an actuarial valuation as of June 30, 1977, 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 Administrator of this Plan.

The 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, 1977

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 ten years of service required for full service benefit.

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

   b. Monthly Annuity:

      2½% 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 five years.

2. Disability Benefit

   a. Requirements:

In Line of Duty:	None.
Not in Line of Duty:	Five 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:	2½% 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. Widow's and Orphan's Benefits

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 $156.25 per month plus increases authorized in 1976 and 1977.

b. Retired Members: None

4. Other Death Benefit

(Lump Sum): None

5. Termination of Employment Benefit

Refund of Participant's contributions without interest may be applied for upon termination with less than 20 years of service. If refund is not applied for and Participant has completed ten years of service, a vested deferred annuity may be payble commencing at age 55.

6. Contributions

Members:	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 3½% each year.
5.	Retirement Age:	The assumed average ages at retirement for this fund were 57.0 for the Highway Patrol group and for the State Police Officers group hired after 6-30-61, and 62.5 for the State Police Officers group hired before 7-1-61.
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	$ 1,874,598
Administrative Expense	34,981
Accrued Liability	54,026,436

2. Current Deficit from Full Funding

Accrued Liability	$54,026,436
Assets in Fund*	32,177,068
Unfunded Accrued Liability	$21,849,368

3. Annual Payment to Achieve Full Funding by 1997

Annual Deposit to Retire Deficit by 1997	$ 1,669,762
Total Normal Cost	1,874,598
Administrative Cost	34,981
Total Annual Payment	$ 3,579,341

4. Minimum Contribution to Prevent Increase in Deficit

Interest on Deficit at 5%	$ 1,092,468
Total Normal Cost	1,874,598
Administrative Expense	34,981
Minimum Contribution	$ 3,002,047

5. Income of Fund during Fiscal Year Ending June 30, 1977*

Members' Contributions	$ 1,030,851
Taxes or Public Funds	2,827,652
Total Contributions	$ 3,858,503
Investment Income (excluding Adjustable Fund)	1,177,120

6. Annual Payroll*

Total Projected Payroll, 1977-1978	$12,974,808

* Data furnished by Administrator. For valuation purposes, assets from Minnesota Adjustable Fixed Benefit Fund taken equal to reserves for benefits payable from this Fund.

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	$1,198,150
Disability Benefit	356,296
Withdrawal Benefit	4,710
Survivor's Benefit	228,452
Vesting	86,990
Total Normal Cost	$1,874,598

This total normal cost and the administrative expense equal 14.72% of the total payroll as of June 30, 1977.

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	$35,891,979
Disability Benefit	2,878,595
Withdrawal Benefit	31,235
Survivor's Benefit	2,203,425
Vesting	1,159,666
Total for Active Members	$42,164,900
2. Inactive Members	
Retired	$ 7,397,681
Disabled	619,925
Deferred Retired	726,003
Widows	1,887,797
Orphans	170,168
Survivor's Benefit	1,057,306
Nonvested Refunds Due	2,656
Total for Inactive Members	$11,861,536
Total Accrued Liability	$54,026,436

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 6-30-76*		
Accrued Liability	$47,221,956	
Assets	27,160,144	
Unfunded Accrued Liability		$20,061,812
As of 6-30-77		
Accrued Liability	$54,026,436	
Assets	32,177,068	
Unfunded Accrued Liability		$21,849,368
Increase in Unfunded Accrued Liability		$ 1,787,556
Increases:		
Salary Scale Loss	$ 2,694,000	
Mortality and Termination Loss	237,671	
Mortality Loss - MAFBF	124,331	
Capital Loss	47,502	
Total Increases		$ 3,103,504
Decreases:		
Excess Interest	$ 179,937	
Amortization Contribution	1,136,011	
Total Decreases		$ 1,315,948
Net Increase		$ 1,787,556

*Restated to reflect adjustments in MAFBF mortality gains and losses for the 1974-75 and 1975-76 plan years.

F. CENSUS OF MEMBERSHIP AND BENEFITS AS OF JUNE 30, 1977

	Number	Annual Payroll
Status		
Active Members	756	$12,974,808
Status		
Service Retirements	154	$ 840,426
Disability Retirements	8	49,127
Widow Annuitants	76	190,603
Orphan Annuitants	30	28,033
Status		
Deferred Annuitants	17	$ 96,508

G. ANALYSIS OF CHANGES IN MEMBERSHIP

Active Members

Number as of 6-30-76	768
New Entrants	18
Reinstatement	1
Total	787
Deaths	2
Withdrawals with Vested Benefits	3
Withdrawals without Vested Benefits	8
Retired	15
Disabled	3
Total Terminations	31
Number as of 6-30-77	756

Service Retirements

Number as of 6-30-76	141
Newly Retired	15
Transfer from Deferred Status	1
Transfer from Disabled Status	0
Total	157
Deaths	3
Number as of 6-30-77	154

Disabled Annuitants

Number as of 6-30-76	5
Newly Disabled	3
Total	8
Transfer to Retired Status	0
Number as of 6-30-77	8

Widow Annuitants

Number as of 6-30-76	72
Newly Widowed Active	2
Newly Widowed Retired	3
Reinstatement	1
Total	78
Deaths	1
Remarried	1
Number as of 6-30-77	76

Orphan Annuitants

Number as of 6-30-76	31
Newly Orphaned	3
Reinstated	1
Total	35
Orphans Attaining Maximum Age	5
Number as of 6-30-77	30

Deferred Annuitants

Number as of 6-30-76	15
New Deferred Annuitants	3
Total	18
Transfer to Retired Status	1
Transfer to Active Status	0
Deaths	0
Transfer to Widow Status	0
Total Terminations	1
Number as of 6-30-77	17

H. AVERAGE AGES AT ENTRY AND RETIREMENT

	Highway Patrol	State Police Officers
The average age at which employment commences is as follows:		
All Current Active Members:	27.7	30.3
	(Including State Police Officers hired after June 30, 1961)	(Those hired prior to July 1, 1961)
New Entrants:		
Fiscal Year		
1971-1972	25.0	27.6
1972-1973	24.1	30.8
1973-1974	33.9	26.7
1974-1975	27.7	
1975-1976	27.1 (Highway Patrol and State Police Officers combined)	
1976-1977	27.9 (Highway Patrol and State Police Officers combined)	
The average age at which service retirements have taken place is as follows:		
All Current Service Retirements:	59.7 (Highway Patrol and State Police Officers combined)	
New Retireds:		
Fiscal Year		
1971-1972	57.9	63.5
1972-1973	57.2	62.7
1973-1974	59.5	64.3
1974-1975	59.6	
1975-1976	60.4 (Highway Patrol and State Police Officers combined)	
1976-1977	58.2 (Highway Patrol and State Police Officers combined)	

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, 1977, on the basis of accepted actuarial methods and procedures. The valuation was completed in accordance with the requirements of the pertinent chapters of Minnesota Laws.

Franklin C. Smith

Franklin C. Smith
Associate, Society of Actuaries
Stennes & Associates, Inc.
Actuaries and Consultants

Thomas J. Kuhlman

Thomas J. Kuhlman
Associate, Society of Actuaries
Stennes & Associates, Inc.
Actuaries and Consultants

HIGHWAY PATROLMEN VALUATION AS OF JUNE 30, 1977

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 356 of Minnesota Laws 1974. 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. Conclusion.

1. Statistical and Valuation Data

Results of the valuation reports as of June 30, 1976 and June 30, 1977 are shown for comparative purposes. Figures are rounded where necessary for simplicity of presentation.

	June 30, 1976	June 30, 1977
(1) Membership		
Active Members	768	756
Deferred Annuitants	15	17
Retired Members	141	154
Disabled Members	5	8
Widows of Deceased Members	72	76
Children of Deceased Members	31	30
(2) Payroll and Annuities Payable	(Thousands of Dollars)	
Total Payroll	$ 11,997	$ 12,975
Annuities (annual)	902	1,205
(3) Valuation Balance Sheet	(Thousands of Dollars)	
Accrued Liability	$ 47,222	$ 54,026
Assets	27,160 *	32,177
Unfunded Accrued Liability (Deficit)	$ 20,062 *	$ 21,849
Funding Ratio (Assets/Accrued Liability)	57.5% *	59.6%

* Restated.

	June 30, 1976	June 30, 1977
(4) Normal Cost and Funding Costs	% of Payroll	% of Payroll
Normal Cost	14.42%	14.45%
Administrative Expense	0.26	.27
Normal Cost plus Expense	14.68%	14.72%
Normal Cost plus Expense	14.68%	14.72%
Interest on Deficit	8.36 *	8.42
Total (Minimum Contribution)	23.04% *	23.14%
Normal Cost plus Expense	14.68%	14.72%
Amortization by 1997	12.43 *	12.87
Total (Required Contribution)	27.11% *	27.59%
(5) Statutory Contributions		
Employee	8.0%	8.0%
Employer Regular	12.0	12.0
Employer Additional	10.0	10.0
Total Contributions	30.0%	~~30.0%~~ changed to 26 ⅔
(6) Investment Yield **	5.19%	5.98%

* Restated.

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

2. Discussion of Valuation Results

The restatement of the 1976 deficit and of the corresponding funding cost figures was a result of recognizing the effect of the recent amendment to Section 11.25 of the statutes on the 1976 anniversary in order that the results for the two valuations be comparable.

The normal cost figures as a percentage of payroll are about the same for the two years. The increase in the deficit combined with a decrease of one year in the amortization period produced an increase in the required amortization contribution even when it is related to the larger payroll.

The unfunded accrued liability increased from $20,061,812 to $21,849,368 during the year, an increase of $1,787,556. The following is an approximate analysis of this change:

Increases:

Salary Scale Loss	$2,694,000	
Mortality and Termination Loss	237,671	
Mortality Loss - MAFBF	124,331	
Capital Loss	47,502	
Total Increases		$3,103,504

assumed 3.5%

Decreases:

Excess Interest	$ 179,937	
Amortization Contribution	1,136,011	
Total Decreases		1,315,948
Net Increase		$1,787,556

assumed 5%

As indicated above, Section 11.25 of the statutes was amended by the 1977 Legislature to require a different method of calculating mortality gains and losses among participants in the Adjustable Fund. The amendment also required that these gains and losses for the 1974-75 and 1975-76 plan years be recomputed. All of these changes have been reflected in the information given above.

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
STENNES & ASSOCIATES, INC.
Commission Actuaries

MINNESOTA HIGHWAY PATROL OFFICERS' RETIREMENT FUND

BENEFITS OF PLAN AND CONTRIBUTIONS

This Plan provides the following major benefits:

1. Retirement Benefit

   a. Requirements for retirement:

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

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

   b. Monthly Annuity:

      2½% 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 five years.

2. Disability Benefit

   a. Requirements:

In Line of Duty:	None.
Not in Line of Duty:	Five 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:	2½% 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. Widow's and Orphan's Benefits

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 $156.25 per month plus increases authorized in 1976 and 1977.

b. Retired Members: None

4. Other Death Benefit

(Lump Sum): None

5. Termination of Employment Benefit

Refund of Participant's contributions without interest may be applied for upon termination with less than 20 years of service. If refund is not applied for and Participant has completed ten years of service, a vested deferred annuity may be payble commencing at age 55.

6. Contributions

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