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CONNECTICUT STATE EMPLOYEES
RETIREMENT SYSTEM

June 30, 1987
ACTUARIAL VALUATION

MILLIMAN & ROBERTSON, INC.
CONSULTING ACTUARIES

THREE CORPORATE PLACE
BLOOMFIELD, CONNECTICUT 06002
203/243-1138

ARTHUR V. ANDERSON, A.S.A.
DOUGLAS J. BENNETT, A.S.A.
AUDREY H. BRISSE, A.S.A.
DOUGLAS M. GRIDER, F.S.A.
JAMES A. GOBES, F.S.A.
LESLIE E. KORPER, II, F.S.A.
ROBERT A. MILLER, III, F.C.A.S.
WILLIAM C. PROUTY, F.S.A.
WALTER S. RUGLAND, F.S.A.
ALTHEA A. SCHWARTZ, F.S.A.

WENDELL MILLIMAN, F.S.A. (1976)
STUART A. ROBERTSON, F.S.A.
CHAIRMAN EMERITUS

November 16, 1987

State of Connecticut
State Employees Retirement Commission
30 Trinity Street
Hartford, CT 06106

Ladies and Gentlemen:

We are pleased to provide this actuarial report for the Connecticut State Employees Retirement System. The report shows the financial status of the system as of June 30, 1987 and presents cost figures for the fiscal year beginning July 1, 1988.

As summarized in Section I, the recommended contribution for the fiscal year beginning July 1, 1988, including Federal reimbursements, is \$374,314,706. This represents an increase of \$52.7 million over 1987-88 costs. We estimate that \$40 million of this increase is the result of correcting the service data generated from the State Employee database. In prior years, we were supposedly given the most recent employment date but it appears that we actually were given the employment date for the current agency; thus any transfer's prior service at another agency had been left out in prior years.

The actuarial method and assumptions used in this valuation are described in Section II of the report; the assumptions have been changed since the last valuation, based on an experience study completed this year. The change in assumptions accounted for approximately \$5 million of the current increase.

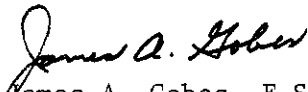
The membership data provided to us was as of June 30, 1987 and included actual compensation paid during fiscal year 1986-1987 (which has been reconciled to total State figures). Compensation figures were brought up to July 1, 1987 payroll levels by adjusting for increases effective as of that date. This data is summarized in Section III and a detailed analysis of the membership by age and service is attached as Exhibit B. We did not audit this data (nor the financial data referred to below); however, they are consistent with comparable data from the previous valuation, except for the service date problem noted above.

Section IV outlines the status of the retirement fund as reported to us by the Retirement Division and describes the adjustment used to spread gains and losses.

The final section of the report outlines our understanding of the benefit provisions embodied in the Connecticut statutes, as amended through 1985.

In our opinion this report fairly presents the financial and actuarial position of the Connecticut State Employees Retirement System as of June 30, 1987, in accordance with generally accepted actuarial principles applied on a basis consistent with the prior valuation, except for the changes in data and in actuarial assumptions noted above. We also certify that, to the best of our knowledge and belief, this report is both complete and accurate; a copy of our separate certification is attached to the report as Exhibit A.

Respectfully submitted,



James A. Gobes, F.S.A.
Consulting Actuary

JAG/cac

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CONNECTICUT STATE EMPLOYEES RETIREMENT SYSTEM

SECTION I

SUMMARY OF JUNE 30, 1987 VALUATION

A. Highlights

The recommended contribution for Fiscal Year 1988 is \$374,314,706. Compared to the FY 1987 contribution of \$321,597,993 this is an increase of \$52.7 million.

An estimated \$40 million of this increase represents correction of understated service dates provided from the database in prior years. Approximately \$5 million is the result of a strengthening of actuarial assumptions, based on the experience study completed during the year.

As a percent of earnings, costs increased by approximately 0.7% from 23.45% to 24.16%.

Barring large gains or losses, the Past Service Payment should remain (approximately) constant over the next few years and become a reducing percentage of pay; the Normal Cost is 8% of covered earnings and should remain at approximately this percentage.

The market value of assets increased by \$368 million to a total of \$2.0 billion. The adjusted market values used for the valuation were reduced by a \$190 million reserve for market fluctuations; this is sufficient to cover a 20% downturn from June 30 values.

SECTION I

B. Actuarial Balance Sheet

Based on the membership and asset information provided to us (and summarized in Sections III and IV), the actuarial method and assumptions described in Section II, and our understanding of the benefit provisions embodied in Connecticut statutes as summarized in Section VI, we have prepared the following valuation of assets and liabilities as of June 30:

<u>ASSETS</u>	<u>June 30,</u> <u>1986</u>	<u>June 30,</u> <u>1987</u>
Retirement Fund		
(Adjusted basis)	\$1,410,707,371	\$1,812,332,140
Present value of future Normal		
Cost contributions	1,311,268,744	1,393,984,826
Unfunded Accrued Liability	<u>2,643,312,667</u>	<u>2,899,625,697</u>
TOTAL ASSETS	\$5,365,288,782	\$6,105,942,663
 <u>LIABILITIES</u>		
Present value of benefits		
Active Members		
Tier I	\$3,588,294,820	\$4,073,520,034
Tier II	163,133,861	345,442,987
Retired Members	1,603,731,234	1,678,583,438
Terminated Vested Members	<u>10,128,867</u>	<u>8,396,204</u>
TOTAL LIABILITIES	\$5,365,288,782	\$6,105,942,663

SECTION I

C. Projection of Normal Costs

The valuation calculated Normal Costs as of July 1, 1987 based on earnings as of that date, including adjustments for negotiated settlements and for July 1 increases. Earnings were projected to July 1, 1988 by assuming that 6% of the Tier I employees will terminate during the twelve month period and be replaced by Tier II employees at 75% of the terminated employee's earnings level; remaining Tier I employees and all Tier II employees (including replacements of Tier II terminations) are assumed to receive increases as of July 1, 1988 equal to 10%. This produced the following projected Normal Costs:

<u>Tier</u>	<u>Plan</u>	<u>Estimated Earnings 7/1/87</u>	<u>Normal Cost Percentage</u>	<u>Projected Earnings 7/1/88</u>	<u>Normal Cost 7/1/88</u>
I	HD	\$ 106,208,754	15.7203%	\$ 109,819,852	\$ 17,264,010
I	B	878,469,924	7.4132	908,337,902	67,336,905
I	C	<u>109,721,659</u>	7.3487	<u>113,452,196</u>	<u>8,337,262</u>
Total Tier I		\$1,094,400,337		\$1,131,609,950	\$ 92,938,177
II	HD	\$ 29,683,116	15.0206%	\$ 37,430,822	\$ 5,622,334
	Other	<u>305,001,949</u>	6.9895	<u>379,970,765</u>	<u>26,558,057</u>
Total Tier II		\$ 334,685,065		\$ 417,401,587	\$ 32,180,391
Grand Total		\$1,429,085,402		\$1,549,011,537	\$125,118,568

1988 Normal Cost (as percent of Earnings)

Tier I	8.21%
Tier II	7.71%
Total	8.08%

SECTION I

D. Projection of Total Cost

The Unfunded Liability as of the valuation date (the beginning of the fiscal year) was brought forward to the end of the fiscal year by adding interest and the fiscal year Normal Cost, with interest, and subtracting expected contributions, also with interest:

<u>Development of Unfunded</u>	<u>Fiscal Year</u> <u>1986-87</u>	<u>Fiscal Year</u> <u>1987-88</u>
Unfunded Accrued Liability, 7-1	\$2,643,312,667	\$2,899,625,697
+ Interest	198,248,450	246,468,184
+ Normal Cost	114,299,990	120,804,026
+ Interest	3,877,741	4,637,063
- State Payments	280,091,209	278,643,557
- Federal Payments	38,725,240	42,954,436
- Employee Contributions	26,051,098	29,348,817
- Interest	<u>11,699,976</u>	<u>13,471,093</u>
Unfunded Accrued Liability, 6-30	\$2,603,171,325	\$2,907,117,067
Amortization Period	39 years	38 years

Summary of Costs

Normal Cost	\$ 120,804,026	\$ 125,118,568
Amortization of Unfunded	<u>200,793,967</u>	<u>249,196,138</u>
Total Cost	\$ 321,597,993	\$ 374,314,706
 Total Cost (as a percent of payroll)	 23.45%	 24.16%

CONNECTICUT STATE EMPLOYEES RETIREMENT SYSTEM

SECTION II

ACTUARIAL METHOD AND ASSUMPTIONS

A. Funding Method

1. The actuarial valuation method used in the cost calculations is the Entry Age Normal Cost Method. Recommended annual contributions until the accrued liability is completely funded will consist of two pieces: Normal Cost plus a payment towards the Unfunded Accrued Liability.
2. The Normal Cost is determined by calculating the present value of future benefits for present active Members that will become payable as the result of death, disability, retirement or termination. This cost is then spread as a level percentage of earnings from entry age to termination as an Active Member.
3. If Normal Costs had been paid at this level for all prior years, a fund would have been accumulated. Because this fund represents the portion of benefits that would have been funded to date, it is termed the Accrued Liability. In fact, it is calculated by adding the present value of benefits for retired Members and Terminated Vested Members to the present value of benefits for active Members and subtracting the present value of future contributions.
4. The Unfunded Accrued Liability is the Accrued Liability less Current Assets.
5. Since the valuation was done as of June 30, 1987, costs have been projected to July 1, 1988 in order to correspond to the fiscal year as follows:

SECTION II

A. Funding Method (cont'd)

- A. Normal costs were determined as a percentage of earnings, by Tier, as of July 1, 1987. Earnings were projected to July 1, 1988, separately for each Tier because of the shifting Tier populations, and the projected earnings were then multiplied by the normal cost factors, by Tier.
- B. The Unfunded Accrued Liability was determined as of June 30, 1987, and brought forward to June 30, 1988 by adding the Normal Cost plus interest and subtracting expected employee, State, and Federal contributions, also with interest. This amount was amortized over the 38 years remaining in the original 40 year amortization period.
- C. Normal Cost and Past Service Amortization payments were adjusted to reflect payment in twelve equal installments at the end of each month.

SECTION II

B. ACTUARIAL ASSUMPTIONS

	<u>Prior</u>	<u>Current</u>
Mortality:	1971 Group Annuity Mortality Table with ages set back 6 years for females.	1983 Group Annuity Mortality Table with ages set back 4 years for females.

Investment Return:	7½%	8½%
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Salary Scale:	<u>Age</u>	<u>Annual Rate of Increase</u>	<u>Annual Rate of Increase</u>
	20	6.34%	10.2%
	25	6.26	9.2
	30	6.10	8.1
	35	5.90	7.1
	40	5.58	6.5
	45	5.22	6.0
	50	4.95	6.0
	55	4.83	6.0
	60	4.66	6.0

Disability:	<u>Age</u>	<u>Annual Rate of Disability (Per 1000 Lives)</u>	<u>Annual Rate of Disability (Per 1000 Lives)</u>
	20	0.60	0.75
	25	0.90	0.85
	30	1.10	0.97
	35	1.50	1.21
	40	2.20	1.70
	45	3.60	2.79
	50	6.10	5.09
	55	10.10	9.25
	60	13.80	14.42

Service connected are assumed to comprise 50% of total Disability for Hazardous Duty and 20% for others.

Same

SECTION II

B. ACTUARIAL ASSUMPTIONS (cont'd)

	<u>Prior</u>	<u>Current</u>																																												
Social Security Wage Base Increases:	3½% compounded annually.	Same																																												
 Retirement Ages: Hazardous Duty:																																														
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Tier I: Age 53 and 25 years of service.		<table style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td style="width: 15%;"></td> <td style="width: 15%; text-align: center;">47-50</td> <td style="width: 15%; text-align: center;">50%</td> <td style="width: 15%; text-align: center;">10%</td> </tr> <tr> <td></td> <td style="text-align: center;">51</td> <td style="text-align: center;">48</td> <td style="text-align: center;">10</td> </tr> </tbody> </table>		47-50	50%	10%		51	48	10																																				
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SECTION II

B. ACTUARIAL ASSUMPTIONS (cont'd)

	<u>Prior</u>	<u>Current</u>
Turnover:	Estimated by excluding participants with less than one year of service and assuming that all other employees terminate at the following rates:	Five year select and ultimate rates as shown in the Turnover Table below for non-hazardous duty males; the same table with rates <u>increased</u> 10% for females; the same table with rates <u>reduced</u> 50% for hazardous-duty males.

<u>Age</u>	<u>Annual Rate of Withdrawal</u>
20	5.44%
25	5.29
30	5.07
35	4.70
40	4.19
45	3.54
50	2.47
55	.94
60	-

Turnover Table

<u>Age</u>	<u>Years of Participation</u>					
	0	1	2	3	4	5 & Over
20	50%	45%	30%	25%	20%	15%
25	45	35	30	25	20	10
30	40	30	25	20	15	8
35	35	28	20	15	10	6
40	30	20	10	8	6	4
45	20	10	8	6	4	2
50	10	8	6	4	2	0
55	10	7	5	2	0	0
60	10	0	0	0	0	0

SECTION II

B. ACTUARIAL ASSUMPTIONS (cont'd)

	<u>Prior</u>	<u>Current</u>
Cost of Living Increases:	3% per year for retirees on or after 1-1-80. 4½% per year for retirees prior to 1-1-80.	Same
Asset Valuation:	Adjusted cost value: assets are written up (or down) by 20% of the difference between market value and adjust- ed cost value, plus an additional write-up (or write-down) as necessary so that the resulting adjusted cost value is within 20% of market value.	Adjusted market value: assets are written up (or down) by spreading recognition of gains and losses over five years, plus an ad- ditional write-up (or write-down) as necessary so that the final adjusted value is within 20% of market value.

CONNECTICUT STATE EMPLOYEES RETIREMENT SYSTEM

SECTION III

MEMBERSHIP DATA

A. Active Members

We received data on a total of 52,984 members, including employees of State Aided Institutions. The following analysis compares this data with the July 1, 1986 data (see Exhibit B for distribution by age and service).

	<u>7-1-86</u>	<u>7-1-87</u>	<u>Change</u>	<u>Per Cent Change</u>
Total Employees	49,204	52,984	+3,780	+ 7.7%
Total Earnings (000's)	\$ 1,268.0	\$ 1,429.1	+\$ 161.1	+12.7%
Average Earnings	\$25,769	\$26,972	+1,203	+ 4.7%

Of the active records submitted to us, 904 were rejected due to missing or invalid dates of birth and/or hire. Cost calculations were done using the valid records and then adjusted proportionately for the rejected records.

Earnings figures as of July 1 are actual amounts paid during the previous July 1 to June 30 period, adjusted for negotiated increases and merit adjustments effective through and including July 1; new entrant earnings are annualized.

SECTION III

B. Actives By Plan

<u>Number of Members</u>	<u>7-1-86</u>	<u>7-1-87</u>	<u>Change</u>	<u>Per Cent Change</u>
Hazardous Duty	3,695	4,126	+ 431	+ 11.7%
Plan B	30,024	28,468	-1,556	- 5.2
Plan C	4,599	4,083	- 516	- 11.2
Tier II	10,886	16,307	+5,421	+ 49.8
	<i>49,204</i>	<i>52,984</i>	<i>3,780</i>	
<u>Total Annual Compensation (millions)</u>				
Hazardous Duty	\$ 118.1	\$135.9	+\$17.8	+ 15.1%
Plan B	882.4	878.5	- 3.9	- 0.4
Plan C	118.9	109.7	- 9.2	- 7.7
Tier II	148.6	305.0	NA	NA
<u>Average Compensation</u>				
Hazardous Duty	\$ 31,948	\$32,938	+\$ 990	+ 3.1%
Plan B	29,390	30,858	+ 1,468	+ 5.0
Plan C	25,846	26,873	+ 1,027	+ 4.0
Tier II	13,655	18,703	NA	NA

Hazardous Duty Members include 1,209 Tier II Members, compared to 789 last year. Because of their higher average age, Plan C continues to decrease more rapidly than Plan B. Tier II increases in compensation and average compensation have not been calculated because 7-1-87 figures have been annualized for new entrants.

SECTION III

B. Actives By Plan (cont'd)

This analysis of age and service excludes the 904 records with incorrect birth dates or hire dates.

	<u>7-1-86</u>	<u>7-1-87</u>	<u>Change</u>
<u>Average Age</u>			
Hazardous Duty	38.6	37.7	- 0.9
Plan B	43.3	44.0	+ 0.7
Plan C	53.7	54.0	+ 0.3
Tier II	34.3	34.6	+ 0.3

Average Years of Service

Hazardous Duty	9.4	9.0	- 0.4
Plan B	10.5	12.7	+ 2.2
Plan C	12.3	14.3	+ 2.0
Tier II	1.6	1.9	+ 0.3

Tier I ages go up less than one year because of retirements. Tier I service includes purchased service for both years.

The increase in average service for Plan B and C Members is a direct reflection of the improved reporting of employment dates.

SECTION III

C. Retired and Terminated Vested Members

The following compares the current retired data with the June 30, 1986 data.
[See Exhibit C for analysis of retirees by age, year of retirement and type of retirement].

	<u>6-30-86</u>	<u>6-30-87</u>	<u>Change</u>	<u>Per Cent Change</u>
<u>Pensioners</u>				
Number	18,108	18,761	+ 653	+ 3.6%
Total Annual Benefit*	\$143,327	\$158,494	+\$15,167	+10.6
Average Monthly Benefit	\$ 660	\$ 704	+\$ 44	+ 6.7

Beneficiaries

Number	672	749	+ 77	+11.5%
Total Annual Benefit*	\$ 4,514	\$ 5,259	+\$745	+16.5
Average Monthly Benefit	\$ 560	\$ 585	+\$ 25	+ 4.5

Terminated Vested

Number	500	554	+ 54	+10.8%
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* (000 omitted)

CONNECTICUT STATE EMPLOYEES RETIREMENT SYSTEM

SECTION IV

RETIREMENT FUND

A. Summary of Fund

Market Value, July 1, 1986 \$1,638,749,985

Contributions

State	\$275,816,449	
Federal	42,954,436	
Employee	<u>27,782,636</u>	
		\$ 346,553,521

Investment Income

Interest and Dividends	\$124,970,175	
Realized Gains	2,414,092	
Change in Unrealized Gains	<u>52,019,533</u>	
		\$ 179,403,800

Disbursements

Benefit payments	\$154,859,865	
Employee refunds	2,802,609	
Expenses (Net)	<u>120,269</u>	
		\$ 157,782,743

Market Value, June 30, 1987 \$2,006,924,563

SECTION IV

B. June 30, 1987 Assets

The following is the Market Value of the State Employees Retirement Fund assets as reported to us by the Retirement Division:

Cash		\$ 12,906.13
Accrued Interest		\$ 9,515,382.36
Investments		
Short Term	\$129,359,208.00	
Fixed Income	692,204,159.44	
Equity	909,314,486.75	
Contract	8,641,935.45	
Mortgage	11,464,397.75	
Real Estate	<u>246,412,086.87</u>	
		<u>\$1,997,396,274.26</u>
Total Market Value of Assets June 30, 1987		\$2,006,924,562.75

SECTION IV

C. Adjusted Market Value

<u>Year Ending</u>	<u>Realized Gains/Losses</u>	<u>Change in Unrealized Gains/Losses</u>	<u>Total Gains/Losses</u>
6-30-87	\$ 2,414,092	\$ 52,019,533	\$ 54,433,625
6-30-86	10,589,632	177,973,874	188,563,506
6-30-85	2,560,935	99,126,081	101,687,016
6-30-84	2,357,847	(16,194,782)	(13,836,935)
6-30-83	83,440	114,387,557	114,470,997

The derivation of the 1987 Adjusted Market Value is shown below.

1. Market Value of Assets 6-30-87:	\$2,006,924,563
2. 5-Year Gains and Losses Not Yet Recognized:	
80% of FY 87	43,546,900
60% of FY 86	113,138,104
40% of FY 85	40,674,806
20% of FY 84	<u>(2,767,387)</u>
	\$ 194,592,423
3. 20% of (1)	\$ 401,384,913
4. Adjusted Market Value of Assets 6-30-87:	\$1,812,332,140
(1) - (2), within (1) ± (3)	

CONNECTICUT STATE EMPLOYEES RETIREMENT SYSTEM

SECTION V

SUMMARY OF PLAN PROVISIONS

Effective Date

September 1, 1939

System Eligibility

Tier I

[Sec. 5-160]

Each state employee appointed to classified service shall become a member on the first day of the pay period following permanent appointment.

Each officer elected by the people and each appointee of such officer exempt from classified service may elect to become a member, effective on the first day of the pay period following receipt of such election.

Each other state employee exempt from classified service shall become a member on the first day of the pay period following six months of employment.

Tier II [Sec. 23]

Each state employee becomes a member on the first day of employment.

Plan Eligibility

Tier I [Sec. 6]

Except as noted below employees hired prior to January 1, 1984 could elect (no later than January 2, 1984) to be covered under either Plan B or Plan C. Employees under contracts with Union Independent and CSEA unions hired prior to October 1, 1982 had until October 1, 1984 to make such election.

Tier II [Sec. 23]

Employees first joining the retirement system on or after January 1, 1984 plus employees hired between July 1, 1982 and January 1, 1984 who elected Tier II.

Normal Retirement Date

State Police [Sec. 5-173 as amended by Sec. 17]

Age 47 and 20 years of service.

Tier I
[Sec. 5-162]

Age 55 and 25 years of service, age 60 and 10 years of service, or age 70.

Tier II [Sec. 28 & 30]

Age 65 and 10 years of service or age 70 and 5 years of service, except hazardous duty members may retire after 25 years.

Normal Retirement Benefit

State Police [Sec. 5-173 as
amended by Sec. 17]

50% of Final Average Earnings plus 2%
for each year in excess of 20.

Tier I, Plan B
Benefit [Sec. 5-162]
Minimum [Sec. 10]

Same as Plan C up to age 65; thereafter
1% of Final Average Earnings up to
\$4,800 plus 2% of Final Average
Earnings in excess of \$4,800 times
years, reduced for retirement prior to
age 65 with less than 25 years.
Minimum benefit with 25 years, \$300 per
month.

Tier I, Plan C
Benefit [Sec. 5-162]
Minimum [Sec. 10]

2% of Final Average Earnings times
years of service, reduced for
retirement prior to age 65 with less
than 25 years. Minimum with 25 years,
\$300 per month.

Tier II
Hazardous Duty Members
[Sec. 30]

2% of Final Average Earnings times
years of service. Minimum with 25
years, \$300 per month (or less if
retirement before 7-1-87).

All Other [Sec. 28]

1 1/3% of Final Average Earnings plus
1/2% of Final Average Earnings in excess
of the year's breakpoint*, times years
of service from 10-1-82. Minimum with
25 years, \$300 per month (or less if
retirement before 7-1-87).

* \$10,700 increased by 6% each year after 1982, rounded to the nearest \$100.

Early Retirement

State Police

None.

Tier I

[Sec. 5-162]

Age 55 and 10 years of service; Normal Retirement Benefit reduced additionally for retirement prior to age 60.

Tier II [Sec. 29]

Age 55 and 10 years of service; Normal Retirement Benefit reduced $\frac{1}{2}\%$ for each month prior to age 65; Minimum benefit with 25 years, \$300 per month (or less if retirement prior to 7-1-87).

Deferred Retirement

Tier I

[Sec. 5-162]

May be deferred but not beyond age 70.

Tier II [Sec. 28 (b) and (e)]

May be deferred but not beyond age 70.

Benefit is based on salary and service to actual retirement.

Vesting

Tier I

[Sec. 5-166 as amended in part by Sec. 13]

Ten years of service; actuarially reduced benefit payable at age 55; in addition employees are always fully vested in their own contributions (after 1-1-83, Tier I, contributions with 5% interest from 1-1-82).

Tier I, Hazardous Duty
[Sec. 17]

As above, but may receive full benefits at age 47 if 20 years of service at termination.

Tier II [Sec. 31]

Ten years of service or age 70 and 5 years; benefit payable at age 65 or early retirement benefit payable at age 55; minimum benefit with 25 years, payable after age 55, \$300 per month (or less if retirement before 7-1-87).

Employee Contributions

State Police, Hazardous Duty
[Sec. 5-161]

5% of earnings.

Plan C [Sec. 5-161]

5% of earnings.

Plan B [Sec. 5-161]

2% of earnings up to Social Security Taxable Wage Base plus 5% above that level.

Tier II [Sec. 37]

None.

Cost of Living

[Sec. 5-162b, 5-162d,
Sec. 9 & Sec. 35]

Annual adjustment each July 1 of up to 5% for retirements prior to 7-1-80; 3% for retirements after 7-1-80. For members (or beneficiaries) not covered by Social Security and age 62 and over, the maximum increase is 6%. If an actuarial surplus (as defined in the law) exists, the commission may further increase retired benefits.

Death Benefits

State Police

[Sec. 5-146]

Survivor benefits to spouse of \$550 per month plus \$250 to a surviving dependent child (or \$575 to surviving dependent children).

Tier I

[Sec. 5-165a as amended
by Sec. 12]

If eligible for early or normal retirement, spouse benefit equal to 50% of average of Life Benefit and 50% J&S benefit member would have received. If not eligible to retire but 25 years, same benefit calculated as though age 55 using service and earnings at death.

[Sec. 5-168 as amended
by Sec. 13]

If not eligible for retirement, return of contributions (after 10-1-82, Tier I, with interest from 1-1-82 at 5%).

Tier II [Sec. 34]

If eligible for early or normal retirement, spouse benefit equal to 50% of member's benefit under a 50% J&S. If not eligible to retire but 25 years, same benefit calculated as though age 55 using service and earnings at death.

[Sec. 36]

If death is due to employment, a spouse with dependent child(ren) under 18 will be paid \$7,500 in not less than 60 installments while living and not remarried; also \$20 per month per child under 18. If no children under 18, spouse [or dependent parent(s), if no spouse] will be paid \$4,000 in not less than 60 installments.

Disability Benefits

Tier I [Sec. 16]

For non-service disabilities occurring prior to age 60 and after 5 years of service, benefit equals 3% times base salary times years of service (Maximum $1 \frac{2}{3}\%$ times service to 65). If disability occurs prior to age 60 and is due to service, benefit equals $1 \frac{2}{3}\%$ of salary times service projected to 65 (maximum 30 years) and is payable regardless of length of service. Exception: State Police benefit is accrued benefit.

Maximum disability benefit is lesser of: 100% of salary less Workers Compensation and Social Security and less non-rehabilitation earnings or 80% of salary less Workers Compensation and Social Security. Social Security is primary plus family.

Tier II [Sec. 32]

Prior to age 65 and due to service or after 10 years of service, benefit is $1 \frac{1}{3}\%$ of final average earnings, plus $\frac{1}{2}\%$ of excess earnings times service projected to 65 (maximum 30 years or service to Date of Disability if greater than 30 years). Same maximum as Tier I.

Options

Tier I [Sec. 11]	50% Qualified Joint and Survivor (CA) ¹ .
Tier II [Sec. 33]	50% or 100% Joint and Survivor (CA). Ten years certain and life. Twenty years certain and life. Life ² .

¹ Normal Form if married at least 12 months.

² Normal Form if not married at least 12 months.

Part-Time Employment

[Sec. 5-162g & Sec. 27]

Service treated as if full-time for eligibility. If consistent part-time for all periods, treat as full-time. If varying schedule or some part-time, some full-time, service and salary proportionately adjusted.

CONNECTICUT STATE EMPLOYEES RETIREMENT SYSTEM

EXHIBIT A

CERTIFICATION

MILLIMAN & ROBERTSON, INC.
CONSULTING ACTUARIES

THREE CORPORATE PLACE
BLOOMFIELD, CONNECTICUT 06002
203/243-1138

WENDELL MILLIMAN, F.S.A. (1976)
STUART A. ROBERTSON, F.S.A.
CHAIRMAN EMERITUS

ARTHUR V. ANDERSON, A.S.A.
DOUGLAS J. BENNETT, A.S.A.
AUDREY H. BRISSE, A.S.A.
DOUGLAS M. GEUDER, F.S.A.
JAMES A. GOBES, F.S.A.
LESLIE E. KORPER, II, F.S.A.
ROBERT A. MILLER, III, F.C.A.S.
WILLIAM C. PROUTY, F.S.A.
WALTER S. RUGLAND, F.S.A.
ALTHEA A. SCHWARTZ, F.S.A.

November 16, 1987

CONNECTICUT STATE EMPLOYEES RETIREMENT SYSTEM

Actuarial Valuation

This is to certify that we have prepared an actuarial valuation of the Connecticut State Employees Retirement System as of June 30, 1987.

The valuation was made with respect to the following Members:

- a. 19,510 pensioners (including 749 beneficiaries of deceased Members).
- b. 52,984 active Members with total annual payroll as of July 1, 1987 of \$1,429,085,402.
- c. 554 inactive employees with vested rights.

Based on the above data and the attached actuarial method and assumptions, we determined the following assets and liabilities as of the valuation date:

1. Accrued liability:	
a. Active Members	\$3,024,978,195
b. Retired Members and Beneficiaries	1,678,583,438
c. Vested former Members	8,396,204
d. Total	\$4,711,957,837
2. Assets in fund (at adjusted cost value)	\$1,812,332,140
3. Unfunded liability (Item 1d less Item 2)	\$2,899,625,697
4. Present Value of Vested Benefits	\$2,954,047,545

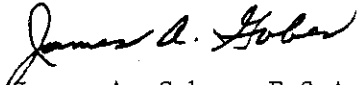
Based on the valuation as of June 30, 1987, projected costs were developed for the fiscal year beginning July 1, 1988, as follows:

1. Employer Normal Cost	
Tier I	\$ 92,938,177
Tier II	32,180,391
Total	<u>\$125,118,568</u>

2.	Payment on Unfunded Liability*	\$249,196,138
3.	Total Employer Cost	\$374,314,706

* Based on amortization of the Unfunded Accrued Liability to be completed by June 30, 2026.

MILLIMAN & ROBERTSON, INC.


James A. Gobes, F.S.A.
Consulting Actuary

Actuarial Method and Assumptions

Funding Method

Entry Age Normal.

Mortality

1983 Group Annuity Mortality Table with ages set back 4 years for females.

Investment Return

8½% compounded annually.

Salary Scale

<u>Age</u>	<u>Annual Rate of Increase</u>
20	10.2%
25	9.2
30	8.1
35	7.1
40	6.5
45	6.0
50	6.0
55	6.0
60	6.0

Turnover

Five year select and ultimate rates as shown in the table below for non-hazardous duty males; the same table with rates increased 10% for females; the same table with rates reduced 50% for hazardous-duty males.

Age	Years of Participation					
	0	1	2	3	4	5 & Over
20	50%	45%	30%	25%	20%	15%
25	45	35	30	25	20	10
30	40	30	25	20	15	8
35	35	28	20	15	10	6
40	30	20	10	8	6	4
45	20	10	8	6	4	2
50	10	8	6	4	2	0
55	10	7	5	2	0	0
60	10	0	0	0	0	0

Retirement Ages

Hazardous Duty:	<u>Age</u>	<u>First Year Eligible</u>	<u>Thereafter</u>
	47-50	50%	10%
	51	48	10
	52	46	10
	53	44	10
	54	42	10
	55	40	10
	56	38	10
	57	36	10
	58	34	10
	59	30	10
	60	50	30
	61	50	30
	62-70	100	100
All Others:	55-60	20	5
	61	40	5
	62	40	30
	63	40	30
	64	60	30
	65	80	60
	66	80	60
	67	80	60
	68	80	60
	69	80	60
	70	100	100

Disability

<u>Age</u>	<u>Annual Rate of Disability (Per 1000)</u>
20	0.75
25	0.85
30	0.97
35	1.21
40	1.70
45	2.79
50	5.09
55	9.25
60	14.42

Service connected are assumed to comprise 50% of total Disability for Hazardous Duty and 20% for others.

Social Security Wage Base
Increases

3½% compounded annually.

Cost of Living Increases

3% per year for retirees on or after
1-1-80. 4½% per year for retirees
prior to 1-1-80.

Asset Valuation

Adjusted market value: assets are
written up (or down) by spreading
recognition of gains and losses over
five years, plus an additional write-
up (or write-down) as necessary so
that the final adjusted value is
within 20% of market value.

CONNECTICUT STATE EMPLOYEES RETIREMENT SYSTEM

EXHIBIT B

ANALYSIS BY AGE AND SERVICE

ANALYSIS BY AGE AND SERVICE - HAZARDOUS DUTY - TIER I
ACTIVE MEMBERS*

AGE	YEARS OF SERVICE											ALL YEARS			
	UNDER 5	5 to 10	10 to 15	15 to 20	20 to 25	25 to 30	30 to 35	35 to 40	40 & Up						
Under 20															
20 to 24	14	2													16
25 to 29	125	124	4												253
30 to 34	140	263	146	5											554
35 to 39	75	163	245	115	6										604
40 to 44	53	89	93	233	83	3									554
45 to 49	42	50	53	84	140	61									430
50 to 54	30	35	28	50	52	32	15								242
55 to 59	16	22	20	28	28	21	15								150
60 to 64	4	12	14	17	16	7	10	7	1						88
65 & Up	1	3	3	4	1	1	2	2							17
TOTALS	500	763	606	536	326	125	42	9	1	42	9	1	1	1	2,908

AVERAGE SALARIES*

Under 20																
20 to 24	\$ 26,596	\$30,426														\$27,074
25 to 29	30,755	32,027	\$36,458													31,469
30 to 34	31,179	34,383	37,229	\$35,023												34,329
35 to 39	32,604	33,461	37,215	40,452	\$36,519											36,239
40 to 44	33,293	34,045	36,556	39,861	42,601	\$44,264										38,178
45 to 49	31,905	34,761	36,179	39,836	41,953	42,736										39,121
50 to 54	33,576	33,698	34,845	37,786	39,317	41,731	\$45,823									37,681
55 to 59	34,643	35,563	33,286	35,708	38,894	40,557	48,908									37,844
60 to 64	37,747	34,985	35,379	35,573	37,508	35,551	46,617	\$30,200								37,690
65 & Up	26,636	35,854	33,083	35,570	36,992	38,165	38,934	38,343								35,614
TOTALS	\$ 31,742	\$33,796	\$36,720	\$39,360	\$41,102	\$41,710	\$46,786	\$41,911	\$30,200	\$46,786	\$41,911	\$30,200	\$30,200	\$30,200	\$30,200	\$36,448

* Based on Members and salaries input to Valuation.

ANALYSIS BY AGE AND SERVICE - HAZARDOUS DUTY - TIER II
ACTIVE MEMBERS*

AGE	YEARS OF SERVICE										ALL YEARS	
	UNDER 5	5 to 10	10 to 15	15 to 20	20 to 25	25 to 30	30 to 35	35 to 40	40 & Up			
Under 20												
20 to 24	235											235
25 to 29	416	13										429
30 to 34	233	7										240
35 to 39	127			2								129
40 to 44	82			1								83
45 to 49	28	1	1	1								31
50 to 54	20											20
55 to 59	18						1					19
60 to 64	1											1
65 & Up												
TOTALS	1,160	21	1	4	1		1					1,187

AVERAGE SALARIES*

Under 20												
20 to 24	\$21,946											\$21,946
25 to 29	25,225	\$30,169										25,375
30 to 34	25,496	30,313										25,636
35 to 39	26,520			\$29,659								26,569
40 to 44	26,101			48,977								26,376
45 to 49	24,578	24,735	37,387	34,815								25,326
50 to 54	25,969											25,969
55 to 59	26,579						\$25,390					26,517
60 to 64	14,278											14,278
65 & Up												
TOTALS	\$24,828	\$29,958	\$37,387	\$35,778	\$25,390							\$24,966

* Based on Members and salaries input to valuation.

ANALYSIS BY AGE AND SERVICE -- TIER II -- ALL OTHERS
ACTIVE MEMBERS*

AGE	YEARS OF SERVICE											ALL YEARS		
	UNDER 5	5 to 10	10 to 15	15 to 20	20 to 25	25 to 30	30 to 35	35 to 40	40 & Up					
Under 20	111													111
20 to 24	2,555	22												2,577
25 to 29	3,616	119	2											3,737
30 to 34	2,757	105	12											2,874
35 to 39	2,112	103	28	42	2									2,287
40 to 44	1,699	69	20	44	1	1								1,834
45 to 49	1,112	54	8	18	3									1,195
50 to 54	766	33	8	18	1									826
55 to 59	550	24	3	10	3						1			591
60 to 64	303	22	1	7		1								335
65 & Up	186	25	5	8	1									225
TOTALS	15,767	576	87	147	11	2	1	1						16,592
<u>AVERAGE SALARIES*</u>														
Under 20	\$10,457													\$10,457
20 to 24	15,486	\$20,687												15,530
25 to 29	18,125	22,133	\$ 15,847											18,252
30 to 34	18,967	23,323	22,516											19,141
35 to 39	19,637	24,717	29,364	\$28,408	\$28,277									20,154
40 to 44	19,038	22,541	29,640	32,966	30,264	\$15,779								19,624
45 to 49	18,254	22,757	30,184	34,670	22,175									18,795
50 to 54	18,535	22,825	24,534	30,069	41,482									19,043
55 to 59	18,284	18,716	23,164	29,496	12,157							\$49,387		18,538
60 to 64	19,012	23,453	5,263	22,776		37,515		\$4,676						19,353
65 & Up	13,886	12,697	18,507	21,140	4,459									14,072
TOTALS	\$ 18,093	\$ 22,402	\$ 26,689	\$ 30,153	\$ 21,432	\$ 26,647	\$ 4,676	\$ 4,676	\$ 49,387					\$ 18,399

* Based on Members and salaries input to valuation; may include some summer employees.

CONNECTICUT STATE EMPLOYEES RETIREMENT SYSTEM

EXHIBIT C

RETIRED BENEFIT ANALYSIS

ANALYSIS OF RETIRED MEMBERS
BY CURRENT AGE

<u>AGE</u>	<u>NUMBER OF RETIREES</u>				<u>AVERAGE BENEFIT</u>			
	<u>DISABILITY</u>		<u>HAZARDOUS DUTY</u>		<u>DISABILITY</u>		<u>HAZARDOUS DUTY</u>	
	<u>SERVICE CONNECTED</u>	<u>NON-SERVICE CONNECTED</u>	<u>SERVICE</u>	<u>HAZARDOUS DUTY</u>	<u>SERVICE CONNECTED</u>	<u>NON-SERVICE CONNECTED</u>	<u>SERVICE</u>	<u>HAZARDOUS DUTY</u>
less than 40	26	12			\$12,757	\$9,059		
40-44	43	20			8,332	8,063		
45-49	47	42	34		9,210	8,945		\$19,278
50-54	59	100	122		8,856	9,106		17,990
55-59	83	160	149		7,010	7,456		16,805
60-64	76	192	166		6,640	6,338		16,169
65-69	58	177	109		5,695	5,797		14,355
70-74	52	141	43		6,641	6,609		13,144
75-79	35	133	25		6,712	6,329		11,152
80-84	20	75	9		6,740	5,676		9,830
85-89	8	36	2		5,210	4,783		6,937
90-94	2	3			1,932	3,378		
95-99	1	3			2,187	4,049		
TOTALS	510	1,094	659		\$7,500	\$6,752		\$16,008

ANALYSIS OF RETIRED MEMBERS
BY YEAR OF RETIREMENT

YEAR OF RETIREMENT	NUMBER OF RETIREES			AVERAGE BENEFIT			HAZARDOUS DUTY
	SERVICE	DISABILITY ¹	DISABILITY ²	SERVICE	DISABILITY ¹	DISABILITY ²	
Pre-1958	154	16	39	\$5,783	\$4,243	\$3,762	\$5,716
1958	39	4	4	4,972	4,602	4,446	7,209
1959	65	4	5	5,431	4,514	4,765	7,806
1960	51	7	4	5,220	3,678	4,065	7,246
1961	67	3	7	5,395	5,595	4,476	7,006
1962	106	9	6	5,899	4,671	4,156	0
1963	119	8	12	5,825	4,908	4,973	6,807
1964	109	12	12	5,208	5,939	4,890	7,350
1965	126	5	6	6,032	4,005	5,094	10,246
1966	150	10	18	5,861	4,696	4,696	0
1967	157	7	22	5,614	4,596	5,434	10,155
1968	216	13	22	6,266	5,687	4,847	6,947
1969	348	14	29	7,032	6,152	6,240	6,373
1970	344	12	54	7,690	5,698	6,425	7,573
1971	506	18	69	7,970	7,232	6,250	10,735
1972	590	29	78	8,257	7,424	6,979	12,209
1973	679	28	79	8,563	9,068	7,302	13,468
1974	542	26	53	7,786	9,143	7,523	14,825
1975	840	50	75	8,474	8,448	7,350	16,308
1976	917	16	57	7,648	7,535	7,180	14,006
1977	741	12	30	7,263	5,805	6,429	13,112
1978	781	10	43	7,124	6,496	5,255	14,805
1979	1,462	12	46	7,502	7,315	5,614	14,839
1980	964	17	40	7,020	5,698	5,210	14,187
1981	788	22	36	7,789	6,719	5,596	14,608
1982	673	17	33	8,056	7,907	6,923	15,562
1983	690	14	43	9,297	8,146	7,761	16,856
1984	873	34	50	9,798	8,675	7,901	17,607
1985	970	36	42	10,563	8,310	9,637	18,684
1986	1,051	39	55	11,647	10,068	8,192	20,518
1987 (to July)	633	6	25	12,182	19,249	13,066	19,737

¹ Service Connected

² Non-Service Connected