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Commonwealth of Massachusetts

ACTUARIAL VALUATION REPORT

AS OF JANUARY 1, 1990

FOR THE

COMMONWEALTH'S TOTAL PENSION OBLIGATION

Division of Public Employee
Retirement Administration

INTRODUCTION AND CERTIFICATION

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This report presents the results of the actuarial valuation of all of the pension benefits which are the obligation of the Commonwealth of Massachusetts as follows:

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Respectfully submitted,
 Public Employee Retirement Administration

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John J. McElyea
 JOHN J. MCELYEA
 Commissioner

DATED: January 9, 1991

SECTION I

INTRODUCTION AND CERTIFICATION

This report presents the results of the actuarial valuation of all of the pension benefits which are the obligation of the Commonwealth of Massachusetts as follows:

- State Employees Retirement System
- Massachusetts Teachers' Retirement System
- Boston Teachers
- Cost of Living allowances to local systems

The valuation was performed as of January 1, 1990 pursuant to Chapter 32 of the General Laws of the Commonwealth of Massachusetts, as amended by Chapter 697 of the Acts of 1987. This report will show results which reflect the funding schedule as described in Chapter 32, section 22C. The actuarial assumptions used to calculate the accrued liability and the normal cost are the same as those used in the actuarial valuation as of January 1, 1987. It is our opinion that the assumptions used are each reasonably related to plan experience and expectations.

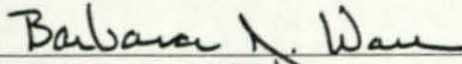
The valuation was based on member data as of December 31, 1989 which was supplied by the Boston, State, and Teachers' Retirement Boards. Such tests as we deemed necessary were performed on the data to ensure accuracy. Asset information as of December 31, 1989 was provided by the Office of the State Treasurer and by the Pension Reserve Investment Management Board and by the Annual Statement for the Financial Condition as submitted to this office by the Boston Retirement Board in accordance with M.G.L. Chapter 32, sections 20(5)(h), 23(1)(c) and 23(2)(e).

In our opinion, this report represents an accurate appraisal of the actuarial status of the Commonwealth's total pension obligation performed in accordance with generally accepted actuarial principles and practices relating to pension plans.

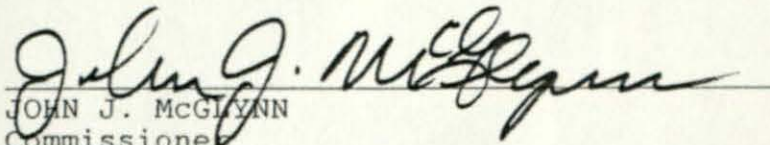
Normal Cost	\$ 351,452
Amortization Cost	158,245
(1) Total Funding Schedule Amount	\$ 509,697
(2) Cost of Benefits	719,874
Required Appropriation	1,229,571
Maximum of (1) or (2)	1,229,571

Please see pages 9 and 10 of this report for a description of the above costs.

Respectfully submitted,
Public Employee Retirement Administration



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JOHN J. MCGLYNN
Commissioner

DATED: January 9, 1991

SECTION II

PART B Comparison with SUMMARY DISCUSSIONPART A Costs under Current Plan

Section 22C of M.G.L. Chapter 32 established a funding schedule for the Commonwealth of Massachusetts pension obligation. The schedule, as mandated by law, calls for payment of the Normal Cost plus an amortization payment on the Unfunded Actuarial Liability. The amortization payments must be such that the Unfunded Actuarial Liability as of January 1, 1987 is reduced to 0 by June 30, 2028, and these payments may not increase at a rate higher than 7 1/2% per year. In addition, for the first ten years of the schedule (through the fiscal year ending June 30, 1998), the total payment must be no less than the total estimated cost of benefits in each of those years and the Pension Reserve Fund shall not be allowed to be reduced from its value on January 1, 1988, increased by 8% per year.

The results of the January 1, 1990 actuarial valuation are as follows (\$000 omitted):

Total Normal Cost	\$	651,150
Employee Contributions		338,069
Net Normal Cost	\$	313,081
Total Actuarial Liability	\$	18,682,500
Assets		7,813,562
Unfunded Actuarial Liability	\$	10,868,938

Please see page 7 for more detail on these amounts.

Based on these results, the amount to be contributed for the fiscal year beginning July 1, 1991 is set forth below (\$000 omitted).

Normal Cost	\$	351,652
Amortization Cost		358,246
(1) Total Funding Schedule Amount	\$	709,898
(2) Cost of Benefits	\$	719,874
Required Appropriation [Maximum of (1) or (2)]	\$	719,874

Please see pages 9 and 10 for an explanation of the development of the above costs.

SECTION II (Continued)

SUMMARY DISCUSSION

PART B Comparison with Prior Valuation

As of January 1, 1987, Chapter 697 (Pension Reform) had not yet taken effect. However, the prior valuation was run on the plan with the \$30,000 cap on salary in place and also on the plan in anticipation of the cap repeal. The repeal of the cap was by far the most significant change, from a financial standpoint, in the reform legislation. The sum of all other modifications from Chapter 697 would have a negligible effect on valuation results. Below we have shown the comparison between the current valuation and the 1987 valuation on the plan with the cap repealed. (\$000 omitted)

	1/1/90	1/1/87	Increase(Decrease)
Total Normal Cost	\$ 651,150	\$ 564,847	\$ 86,303
Employee Contributions	338,069	266,564	71,505
Net Normal Cost	\$ 313,081	\$ 298,283	\$ 14,798
Total Actuarial Liability	\$18,682,500	\$15,848,568	\$2,833,932
Assets	7,813,562	5,403,874	2,409,688
Unfunded Actuarial Liability	\$ 10,868,938	\$ 10,444,694	\$ 424,244

In terms of contribution requirements on a beginning of the year, annual payment basis, the comparison is as follows (\$000 omitted):

	7/1/91	7/1/88	% Change
Normal Cost	\$ 351,652	\$ 318,642	10.4%
Amortization Cost	\$ 358,246	\$ 285,437	25.5%
Total Funding Schedule	\$ 709,898	\$ 604,079	17.5%
Cost of Benefits	\$ 719,874	\$ 590,112	22.0%
Required Approp.	\$ 719,874	\$ 604,079	19.2%

The prior valuation was performed by the consulting firm of Foster Higgins under contract to the Retirement Law Commission. Since that time, there has been extensive data clean up. In addition, it is probable that the demographic composition of the work force changed between January 1, 1987 and January 1, 1990 due to lower rates of hiring. This report is used as the new base for the funding schedule. It would be amortized over 27 years with payments increasing by 7 1/2% per year in accordance with Chapter 32, Section 20. In addition, there are minor changes between the 1987 valuation and this valuation due to the use of a different valuation software.

SECTION II (Continued)
SUMMARY DECISION

PART B Comparison with Prior Valuation (Continued)

The development of the Expected Unfunded Actuarial Liability based on the January 1, 1987 valuation is displayed on Page 8. The difference between this amount and the actual Unfunded Actuarial Liability is known as the Actuarial Gain or Loss. For the period from January 1, 1987 to January 1, 1990, the Actuarial Gain was \$1,470,985,000. Such a gain would be created partly by the higher than assumed investment returns. However, the investment gain would account for no more than about one-third of the total gain and would be at least partially offset by the greater than expected increase in payroll. A major contributing factor to this gain is the age and service assumptions made for state employees hired prior to 1973. Information on these members is largely unavailable. This current valuation assumes that, of the approximately 9,000 members in question, about 2% had less than 20 years of service, 50% had 20 to 24 years, 33% had 25 to 29 years and 15% had 30 or more years. In the 1987 valuation, it appeared that there were about 20,000 members in question and the comparable assumptions were: 16% had less than 20 years of service, 26% had 20 to 24 years, 23% had 25 to 29 years and 35% had 30 or more years. The result of this difference would be a decrease in the Actuarial Liability. Although the amount of this decrease cannot be determined precisely, it can be expected to be most of the total gain.

For the COLA benefits, there was no gain or loss because the amounts for this valuation were developed by simply rolling forward the results of the prior valuation assuming no gains or losses had occurred. This was necessary because there is not enough data to determine the actual costs and liabilities on the date of this report. It was felt that the methodology was realistic, because in FY 89, a COLA increase of 4% was given, but for FY 90, no COLA benefits were given (six months of which would be included in this report). We estimate that these two events would offset each other.

Gains and losses due to actuarial factors would normally be amortized over 15 years with level dollar payments, since, if actuarial assumptions are appropriate, the gains and losses from one year to the next would tend to offset each other. However, gains and losses due to refinements in data and methodology would be amortized over the entire funding schedule, since these changes are one time only and, in fact, should theoretically have been part of the original Actuarial Liability. Because it is impossible to determine at this time how much of the Actuarial Gain is due to actuarial factors and how much is due to other factors, it is our recommendation that for Fiscal Year 1992, the Unfunded Actuarial Liability determined in this report be used as the new base for the funding schedule. It would be amortized over 37 years with payments increasing by 7 1/2% per year in accordance with Chapter 32, Section 22C. In addition, there are minor changes between the 1987 valuation and this valuation due to the use of a different valuation software.

SECTION II (Continued)

SUMMARY DISCUSSION

PART C Considerations for the Future

As discussed at the beginning of this section, the Commonwealth of Massachusetts must make payments in accordance with section 22C of M.G.L. Chapter 32 for the Massachusetts Teachers' Contributory Retirement System, State Employees' Contributory Retirement System, Boston teachers and for cost-of-living allowances (COLA) granted to retirees and survivors of all local systems since the State assumed that liability.

In accordance with section 22C, the Commonwealth must appropriate no less than the cost of benefits in each year through fiscal year 1998. The average annual increase in the Cost of Benefits over the past three years has been approximately 6.8%. The funding schedule may be expected to increase at a rate of approximately 5 1/2% per year, if this trend continues. The cost of benefits would be expected to continue to be the required appropriation amount through FY98. The funding schedule projections on pages 11 to 14 show the funding schedule with an assumed increase in Cost of Benefits of 6.8%.

For purposes of filing financial statements, the Governmental Accounting Standards Board (GASB) issued Statement No. 5 in November, 1986 to be effective from July 1, 1987. The actuarial information required by this statement is on page 15 of this report.

On January 31, 1990, GASB proposed another Statement on establishing standards for recognition and measurement of pension expenditure/expense in financial statements. These requirements, if adopted, will take effect beginning in FY95, but there may be changes before the Statement is finalized. At this time, however, the method which has been used herein to develop funding costs would be acceptable in developing expense amounts in accordance with such Statement with one significant exception. That exception is in the rate of increase in the amortization payments. If the Exposure Draft is adopted, the statement would allow the amortization payments on the Unfunded Actuarial Accrued Liability to increase at a rate no greater than the rate at which payroll is projected to increase (4 1/2% under current assumptions) for purposes of determining pension expense to be disclosed in the financial statements. Since the amortization schedule used for the funding schedule has payments increasing by 7 1/2% per year, the expense amount in the financial statements could be approximately 25% larger than the amount required under the funding schedule. The Commonwealth should be aware of this possibility and should determine the consequences of such a result.

Until the time that the GASB standards on pension expense are finalized, pension expense amounts are being determined in accordance with Accounting Principles Board (APB) Opinion No. 8. See page 16 for further details on this.

SECTION II (Continued)

SUMMARY DISCUSSION

PART D Other Information Available in this Report

As we stated in Part A of this section, the valuation results by type of benefit is on Page 7. The Development of the Actuarial Gain (Loss), as discussed in Part B, is on Page 8. Following that, on Pages 9 to 10 is an explanation of the development of the appropriation amounts. On pages 11 to 14 are projections of the funding schedule based upon beginning of the year payments, end of the year payments, and beginning of the quarter payments.

The actuarial information required by the auditors can be found on Pages 15 and 16 as we described in Part C of this section.

In addition, we have included a summary of asset information on Page 17. Assets are shown on a market value basis. For purposes of developing the Unfunded Actuarial Liability, we have used the market value of assets. In future years, an actuarial value of assets will be developed that will be a five-year average of market values. This will serve to moderate the fluctuations that can occur if an unadjusted market value is used each year.

On Pages 18 to 26, demographic information regarding the members of the State Employees' Retirement System, Massachusetts Teachers' Retirement System, and Boston Teachers is presented. These charts display age, service and salary information for active members and age and benefit information for retirees and survivors. We have also included a description of the missing or invalid data and any assumptions which were made in consideration of such erroneous data.

A description of the funding method used in calculating valuation results is on Page 27 and the actuarial assumptions used are on Pages 28 to 29.

A brief summary of plan provisions appears on Pages 30 to 34.

Finally, a glossary of actuarial terminology is presented on Pages 35 to 37.

SECTION III

SUMMARY OF VALUATION RESULTS (\$000's omitted)

	State Employees	State Teachers	Boston Teachers	COLA	BOSTON TEACHERS	TOTAL	COLA	NET
A. Number of Members								
1. Active	94,942	61,415	5,057	N/A				
2. Vested Terminated	9,316	10,589	0	N/A				
3. Retired & Survivors	35,827	23,268	2,128	N/A				
TOTAL	140,085	95,272	7,185	N/A				
B. Total Active Payroll \$2,800,852 \$2,226,844 \$ 162,558								
C. Normal Cost								
1. Superannuation	\$ 214,382	\$ 147,740	\$ 13,494					
2. Termination	24,151	14,705	1,212					
3. Disability	74,858	26,213	2,106					
4. Death	48,374	33,265	2,534					
Total Normal Cost	\$ 361,765	\$ 221,923	\$ 19,346	\$ 48,116	\$ 31,005	\$ 651,150		
Employee Contributions	194,830	133,291	9,948	0		338,069		
Net Employer Normal Cost	\$ 166,935	\$ 88,632	\$ 9,398	\$ 48,116		\$ 313,081		
D. Actuarial Liability								
1. Active								
a. Superannuation	\$3,065,053	\$4,427,312	\$ 309,960					
b. Termination	60,064	60,190	2,640					
c. Disability	409,055	309,783	20,305					
d. Death	342,571	521,962	33,247					
Total Active	\$3,876,743	\$5,319,247	\$ 366,152	\$ 518,570		\$10,080,712		
Vested Terminated	499,096	1,288,430	88,500*			1,876,026		
Retirees & Survivors	2,759,870	2,233,292	247,568	1,485,032**		6,725,762		
Total Actuarial Liability	\$7,135,709	\$8,840,969	\$ 702,220	\$2,003,602		\$18,682,500		
Assets	3,741,394	3,797,088	275,080	0		7,813,562		
Unfunded Actuarial Liability	\$3,394,315	\$5,043,881	\$ 427,140	\$2,003,602		\$10,868,938		
Funded Ratio	52.4%	42.9%	39.2%	0.0%		41.8%		

*Based on the proportion to Actives as in State Teachers
 **Includes Inactive members

DEVELOPMENT OF THE ACTUARIAL GAIN OR LOSS
(\$000's Omitted)

	<u>STATE</u>	<u>TEACHERS</u>	<u>BOSTON TEACHERS</u>	<u>COLA</u>	<u>TOTAL</u>
A. Development of Expected Unfunded Actuarial Liability					
1. Unfunded Actuarial Liability, 1/1/87	\$ 4,178,000	\$4,254,000	\$ 358,297	\$1,654,397	\$10,444,694
2. Normal Cost, 1/1/87	147,065	101,145	9,191	40,882	298,283
3. Interest on 1. and 2. at 8% per year	346,005	348,412	29,399	135,622	859,438
4. Appropriation paid during 1987	217,439	233,462	18,253	59,705	528,859
5. Interest on 4 (assume mid-year payment).	<u>8,697</u>	<u>9,339</u>	<u>730</u>	<u>2,388</u>	<u>21,154</u>
6. Expected Unfunded Actuarial Liability, 1/1/88 [1.+2.+3.-4.-5.]	\$ 4,444,934	\$4,460,756	\$ 377,904	\$1,768,808	\$11,052,402
7. Projected Normal Cost, 1/1/88	155,500	106,500	9,660	43,217	314,877
8. Interest on 6. and 7. at 8% per year	368,035	365,381	31,005	144,962	909,383
9. Appropriation paid during 1988	248,037	237,937	19,410	71,207	576,591
10. Interest on 9. (assume mid-year payment)	<u>9,922</u>	<u>9,517</u>	<u>776</u>	<u>2,848</u>	<u>23,063</u>
11. Expected Unfunded Actuarial Liability, 1/1/89 [6.+7.+8.-9.-10.]	\$ 4,710,510	\$4,685,183	\$ 398,383	\$1,882,932	\$11,677,008
12. Projected Normal Cost 1/1/89	163,900	111,700	10,149	45,617	331,366
13. Interest on 11. and 12. at 8% per year	389,953	383,751	32,683	154,284	960,671
14. Appropriation paid during 1989	265,605	242,497	20,639	76,184	604,925
15. Interest on 14. (assume mid-year payment)	<u>10,624</u>	<u>9,700</u>	<u>826</u>	<u>3,047</u>	<u>24,197</u>
16. Expected Unfunded Actuarial Liability, 1/1/90 [11.+12.+13.-14.-15.]	\$ 4,988,134	\$4,928,437	\$ 419,750	\$2,003,602	\$12,339,923
B. Actual Unfunded Actuarial Liability	\$ 3,394,315	5,043,881	\$ 427,140	\$2,003,602	\$10,868,938
C. Actuarial Gain (Loss) [A.16.-B.]	\$ 1,593,819	(115,444)	\$ (7,390)	\$ 0	\$ 1,470,985

SECTION V

APPROPRIATION REQUIREMENTS FOR THE FISCAL YEAR BEGINNING JULY 1, 1991
(\$000's Omitted)

B. Amortization Schedule	STATE	TEACHERS		BOSTON TEACHERS		COLA	TOTAL
		TEACHERS	TEACHERS	TEACHERS	TEACHERS		
A. Derivation of Required Appropriation							
1. Normal Cost*							
2. Amortization Payment for the Unfunded Actuarial Liability**							
3. Total Amount Required under Funding Schedule [1.+2.]							
4. Cost of Benefits							
5. Required Appropriation [Maximum of 3. or 4.]							

*Normal Cost, 1/1/90	\$ 166,935	\$ 88,632	\$ 9,398	\$ 48,116	\$313,081
interest to 7/1/91	<u>19,046</u>	<u>10,919</u>	<u>1,158</u>	<u>5,928</u>	<u>38,571</u>
Normal Cost, 7/1/91	\$ 187,501	\$ 99,551	\$10,556	\$ 54,044	\$351,652

**Unfunded Actuarial Liability, 1/1/90	\$ 3,394,315	\$5,043,881	\$427,140	\$2,003,602	\$10,868,938
interest to 7/1/91	<u>418,179</u>	<u>621,406</u>	<u>52,623</u>	<u>246,844</u>	<u>1,339,053</u>
Unfunded Actuarial Liability, 7/1/91	\$ 3,812,494	\$5,665,287	\$479,764	\$2,250,446	\$12,207,991

***Cost of Benefits used, because that is what will be used in total.

NOTE: Payments are assumed to occur on July 1, 1991

SECTION V (Continued)

APPROPRIATION REQUIREMENTS FOR THE FISCAL YEAR BEGINNING JULY 1, 1991
(\$000's Omitted)

B. Amortization Schedule

	Date Established	Original Amount	FY 92 Amortization Payment	July 1, 1991		June 30, 1992		TOTAL NORMAL COST
				Years Remaining	Outstanding Balance	Years Remaining	Outstanding Balance	
STATE	7/1/91	\$3,812,494	\$111,878	37	\$3,812,494	36	\$ 3,996,666	17,348
TEACHERS	7/1/91	5,665,287	166,248	37	5,665,287	36	5,938,962	17,348
BOSTON TEACHERS	7/1/91	479,764	14,079	37	479,764	36	\$ 502,940	
COLA	7/1/91	2,250,446	66,041	37	2,250,446	36	2,359,157	
TOTAL	7/1/91	\$12,207,991	\$358,246	37	\$12,207,991	36	\$12,797,725	

COLA costs assume a 3% COLA rate for FY 91 and thereafter.
Normal Cost for State and Teachers and for Boston Teachers is 1% each year, projected to July 1, 1991 and then assumed to increase at 3.5% for payroll increases, offset by an estimate of increased employee contributions.
For the COLA, the Normal Cost is assumed to increase at 4.5%, since employee contributions do not apply to this benefit.

**APPROPRIATION FOR THE FISCAL YEAR ENDING JUNE 30, 1992
FOR THE COMMONWEALTH OF MASSACHUSETTS**

(\$000's omitted)

VALUATION RESULTS AS OF JANUARY 1, 1990:

	ACTUARIAL LIABILITY	ASSETS	UNFUNDED ACT. LIAB.	EMPLOYER NORMAL COST	EMPLOYEE CONTRIB.	TOTAL NORMAL COST
STATE EMPLOYEES	7,135,709	3,741,394	3,394,315	166,935	194,830	361,765
STATE TEACHERS	8,840,969	3,797,088	5,043,881	88,632	133,291	221,923
COLA	2,003,602	0	2,003,602	48,116	0	48,116
BOSTON TEACHERS	702,220	275,080	427,140	9,398	9,948	19,346
TOTAL	18,682,500	7,813,562	10,868,938	TOTAL NORMAL COST 313,081	338,069	651,150

In establishing the funding schedule outlined below the following assumptions were used:

- Investment Return: 8.00%
- Amort. Payments Increase: 7.50%
- Amortization Period (years): 40 (FY 1989 through FY2028 for 1/1/87 U.A.L.)

COLA costs assume a 3% COLA ON A \$9,000 base for FY 92 and thereafter.
Normal Cost for State and Teachers and for Boston Teachers is in each case, projected to July 1, 1991 and then assumed to increase at 3.0% (an assumption of 4.5% for payroll increases, offset has an estimate of increased employee contributions).
For the COLA, the Normal Cost is assumed to increase at 4.5%, since employee contributions do not apply to this benefit.

FY	ACTUARIAL LIABILITY	ASSETS	UNFUNDED ACT. LIAB.	EMPLOYER NORMAL COST	EMPLOYEE CONTRIB.	TOTAL NORMAL COST
1987	847,219	257,483	184,240	15,346	40,221	55,567
1988	882,518	262,442	189,207	16,222	42,867	59,089
1989	917,817	267,401	194,174	17,107	45,512	62,619
1990	953,116	272,360	199,141	17,992	48,157	66,149
1991	988,415	277,319	204,108	18,877	50,802	69,679
1992	1,023,714	282,278	209,075	19,762	53,447	73,209
1993	1,059,013	287,237	214,042	20,647	56,092	76,739
1994	1,094,312	292,196	219,009	21,532	58,737	80,269
1995	1,129,611	297,155	223,976	22,417	61,382	83,799
1996	1,164,910	302,114	228,943	23,302	64,027	87,329
1997	1,200,209	307,073	233,910	24,187	66,672	90,859
1998	1,235,508	312,032	238,877	25,072	69,317	94,389
1999	1,270,807	316,991	243,844	25,957	71,962	97,919
2000	1,306,106	321,950	248,811	26,842	74,607	101,449
2001	1,341,405	326,909	253,778	27,727	77,252	104,979
2002	1,376,704	331,868	258,745	28,612	79,897	108,509
2003	1,412,003	336,827	263,712	29,497	82,542	112,039
2004	1,447,302	341,786	268,679	30,382	85,187	115,569
2005	1,482,601	346,745	273,646	31,267	87,832	119,099
2006	1,517,900	351,704	278,613	32,152	90,477	122,629
2007	1,553,199	356,663	283,580	33,037	93,122	126,159
2008	1,588,498	361,622	288,547	33,922	95,767	129,689
2009	1,623,797	366,581	293,514	34,807	98,412	133,219
2010	1,659,096	371,540	298,481	35,692	101,057	136,749
2011	1,694,395	376,499	303,448	36,577	103,702	140,279
2012	1,729,694	381,458	308,415	37,462	106,347	143,809
2013	1,764,993	386,417	313,382	38,347	108,992	147,339
2014	1,800,292	391,376	318,349	39,232	111,637	150,869
2015	1,835,591	396,335	323,316	40,117	114,282	154,399
2016	1,870,890	401,294	328,283	41,002	116,927	157,929
2017	1,906,189	406,253	333,250	41,887	119,572	161,459
2018	1,941,488	411,212	338,217	42,772	122,217	164,989
2019	1,976,787	416,171	343,184	43,657	124,862	168,519
2020	2,012,086	421,130	348,151	44,542	127,507	172,049
2021	2,047,385	426,089	353,118	45,427	130,152	175,579
2022	2,082,684	431,048	358,085	46,312	132,797	179,109
2023	2,117,983	436,007	363,052	47,197	135,442	182,639
2024	2,153,282	440,966	368,019	48,082	138,087	186,169
2025	2,188,581	445,925	372,986	48,967	140,732	189,699
2026	2,223,880	450,884	377,953	49,852	143,377	193,229
2027	2,259,179	455,843	382,920	50,737	146,022	196,759
2028	2,294,478	460,802	387,887	51,622	148,667	200,289

PART C1. Projection of Funding Schedule - Beginning of Year Payments

APPROPRIATION FOR THE FISCAL YEAR ENDING JUNE 30, 1992
FOR THE COMMONWEALTH OF MASSACHUSETTS

(\$000's omitted)

FUNDING SCHEDULE

FY ENDING JUNE 30,	STATE AND TEACHERS		COLA		BOSTON TEACHERS		ADDITIONAL PAYMENT	TOTAL PAYMENT	OUTSTANDING BALANCE
	NORMAL COST	AMORT. PYMT.	NORMAL COST	AMORT. PYMT.	NORMAL COST	AMORT. PYMT.			
1992	287,053	278,130	54,044	66,040	10,556	14,979	9,973	719,874	12,786,951
1993	295,664	298,738	56,476	70,934	10,873	15,122	21,020	768,826	13,371,629
1994	304,534	320,599	59,017	76,124	11,199	16,229	33,404	821,106	13,959,295
1995	313,670	343,755	61,673	81,623	11,535	17,401	47,284	876,941	14,546,770
1996	323,081	368,244	64,448	87,438	11,881	18,640	62,842	936,573	15,130,375
1997	332,773	394,095	67,349	93,576	12,237	19,949	80,282	1,000,260	15,705,871
1998	342,756	421,326	70,379	100,041	12,604	21,327	99,844	1,068,278	16,268,400
1999	353,039	449,943	73,546	106,836	12,982	22,776		1,019,123	16,943,952
2000	363,630	483,689	76,856	114,849	13,372	24,484		1,076,880	17,626,604
2001	374,539	519,965	80,314	123,463	13,773	26,321		1,138,375	18,313,403
2002	385,775	558,963	83,929	132,723	14,186	28,295		1,203,870	19,000,897
2003	397,348	600,885	87,705	142,677	14,612	30,417		1,273,644	19,685,072
2004	409,269	645,951	91,652	153,378	15,050	32,698		1,347,998	20,361,289
2005	421,547	694,398	95,776	164,881	15,502	35,150		1,427,254	21,024,208
2006	434,193	746,478	100,086	177,247	15,967	37,787		1,511,757	21,667,713
2007	447,219	802,463	104,590	190,540	16,446	40,621		1,601,879	22,284,816
2008	460,636	862,648	109,297	204,831	16,939	43,667		1,698,018	22,867,563
2009	474,455	927,347	114,215	220,193	17,447	46,942		1,800,599	23,406,927
2010	488,688	996,898	119,355	236,708	17,971	50,463		1,910,082	23,892,688
2011	503,349	1,071,665	124,726	254,461	18,510	54,248		2,026,958	24,313,299
2012	518,449	1,152,040	130,338	273,545	19,065	58,316		2,151,754	24,655,750
2013	534,003	1,238,443	136,204	294,061	19,637	62,690		2,285,038	24,905,400
2014	550,023	1,331,326	142,333	316,116	20,226	67,392		2,427,416	25,045,811
2015	566,524	1,431,176	148,738	339,825	20,833	72,446		2,579,541	25,058,554
2016	583,519	1,538,514	155,431	365,311	21,458	77,879		2,742,113	24,922,998
2017	601,025	1,653,903	162,425	392,710	22,102	83,720		2,915,884	24,616,078
2018	619,056	1,777,945	169,735	422,163	22,765	89,999		3,101,662	24,112,048
2019	637,627	1,911,291	177,373	453,825	23,448	96,749		3,300,313	23,382,197
2020	656,756	2,054,638	185,354	487,862	24,151	104,005		3,512,767	22,394,547
2021	676,459	2,208,736	193,695	524,452	24,876	111,806		3,740,023	21,113,518
2022	696,753	2,374,391	202,412	563,786	25,622	120,191		3,983,154	19,499,562
2023	717,655	2,552,470	211,520	606,070	26,390	129,206		4,243,311	17,508,762
2024	739,185	2,743,906	221,038	651,525	27,182	138,896		4,521,732	15,092,390
2025	761,360	2,949,698	230,985	700,389	27,998	149,313		4,819,744	12,196,428
2026	784,201	3,170,926	241,380	752,918	28,838	160,512		5,138,774	8,761,038
2027	807,727	3,408,745	252,242	809,387	29,703	172,550		5,480,354	4,719,984
2028	831,959	3,664,401	263,593	870,091	30,594	185,491		5,846,129	(0)

(\$000's omitted)

FUNDING SCHEDULE

FY ENDING JUNE 30,	NORMAL COST	AMORT. PYMT.	NORMAL COST	AMORT. PYMT.	NORMAL COST	AMORT. PYMT.	ADDITIONAL PAYMENT	TOTAL PAYMENT	OUTSTANDING BALANCE
1992	295,390	286,207	55,613	67,958	10,862	14,488	10,262	740,781	12,786,952
1993	304,251	307,414	58,116	72,994	11,188	15,561	21,629	791,154	13,371,631
1994	313,379	329,910	60,731	78,335	11,524	16,700	34,373	844,952	13,959,298
1995	322,780	353,739	63,464	83,993	11,870	17,906	48,656	902,409	14,546,774
1996	332,464	378,939	66,320	89,977	12,226	19,192	64,665	963,773	15,130,381
1997	342,438	405,541	69,305	96,293	12,593	20,528	82,613	1,029,309	15,705,878
1998	352,711	433,563	72,423	102,947	12,970	21,947	102,742	1,099,303	16,268,409
1999	363,292	463,011	75,682	109,939	13,359	23,438		1,048,721	16,943,961
2000	374,191	497,737	79,088	118,185	13,760	25,195		1,108,156	17,626,613
2001	385,417	535,067	82,647	127,049	14,173	27,085		1,171,437	18,313,413
2002	396,979	575,197	86,366	136,577	14,598	29,116		1,238,834	19,000,908
2003	408,888	618,337	90,252	146,821	15,036	31,300		1,310,634	19,685,083
2004	421,155	664,712	94,314	157,832	15,487	33,648		1,387,148	20,361,300
2005	433,790	714,565	98,558	169,670	15,952	36,171		1,468,706	21,024,220
2006	446,803	768,158	102,993	182,395	16,430	38,884		1,555,663	21,667,725
2007	460,207	825,770	107,628	196,074	16,923	41,800		1,648,403	22,284,828
2008	474,014	887,702	112,471	210,780	17,431	44,935		1,747,333	22,867,576
2009	488,234	954,280	117,532	226,588	17,954	48,305		1,852,894	23,406,940
2010	502,881	1,025,851	122,821	243,583	18,493	51,928		1,965,557	23,892,701
2011	517,968	1,102,790	128,348	261,851	19,047	55,823		2,085,827	24,313,313
2012	533,507	1,185,499	134,124	281,490	19,619	60,010		2,214,248	24,655,763
2013	549,512	1,274,412	140,159	302,602	20,207	64,510		2,351,402	24,905,414
2014	565,997	1,369,992	146,467	325,297	20,813	69,349		2,497,915	25,045,825
2015	582,977	1,472,742	153,058	349,694	21,438	74,550		2,654,459	25,058,568
2016	600,466	1,583,198	159,945	375,921	22,081	80,141		2,821,753	24,923,011
2017	618,480	1,701,937	167,143	404,115	22,743	86,152		3,000,571	24,616,092
2018	637,035	1,829,583	174,664	434,424	23,426	92,613		3,191,745	24,112,061
2019	656,146	1,966,801	182,524	467,006	24,129	99,559		3,396,165	23,382,210
2020	675,830	2,114,312	190,738	502,031	24,852	107,026		3,614,789	22,394,559
2021	696,105	2,272,885	199,321	539,684	25,598	115,053		3,848,645	21,113,530
2022	716,988	2,443,351	208,290	580,160	26,366	123,682		4,098,838	19,499,573
2023	738,498	2,626,603	217,663	623,672	27,157	132,958		4,366,551	17,508,771
2024	760,653	2,823,598	227,458	670,447	27,972	142,930		4,653,058	15,092,398
2025	783,472	3,035,368	237,694	720,731	28,811	153,650		4,959,725	12,196,435
2026	806,977	3,263,020	248,390	774,786	29,675	165,174		5,288,021	8,761,043
2027	831,186	3,507,747	259,567	832,895	30,565	177,562		5,639,521	4,719,986
2028	856,121	3,770,828	271,248	895,362	31,482	190,879		6,015,920	(0)

PART C3. Projection of Funding Schedule - End of Year

APPROPRIATION FOR THE FISCAL YEAR ENDING JUNE 30, 1992
FOR THE COMMONWEALTH OF MASSACHUSETTS

FUNDING SCHEDULE

FY ENDING JUNE 30,	STATE AND TEACHERS		COLA		BOSTON TEACHERS		ADDITIONAL PAYMENT	TOTAL PAYMENT	OUTSTANDING BALANCE
	NORMAL COST	AMORT. PYMT.	NORMAL COST	AMORT. PYMT.	NORMAL COST	AMORT. PYMT.			
1992	310,017	300,380	58,367	71,324	11,400	15,205	10,770	777,464	12,786,952
1993	319,318	322,637	60,994	76,608	11,742	16,332	22,700	830,331	13,371,631
1994	328,897	346,247	63,739	82,214	12,095	17,527	36,075	886,794	13,959,298
1995	338,764	371,256	66,607	88,153	12,457	18,793	51,066	947,096	14,546,774
1996	348,927	397,704	69,604	94,433	12,831	20,132	67,868	1,011,498	15,130,381
1997	359,395	425,623	72,736	101,062	13,216	21,545	86,704	1,080,280	15,705,878
1998	370,177	455,032	76,010	108,045	13,613	23,034	107,830	1,153,739	16,268,409
1999	381,282	485,939	79,430	115,383	14,021	24,598		1,100,653	16,943,961
2000	392,720	522,384	83,004	124,037	14,442	26,443		1,163,031	17,626,613
2001	404,502	561,563	86,740	133,340	14,875	28,426		1,229,445	18,313,413
2002	416,637	603,680	90,643	143,340	15,321	30,558		1,300,180	19,000,908
2003	429,136	648,956	94,722	154,091	15,781	32,850		1,375,536	19,685,083
2004	442,010	697,628	98,984	165,648	16,254	35,314		1,455,838	20,361,300
2005	455,271	749,950	103,438	178,071	16,742	37,962		1,541,435	21,024,220
2006	468,929	806,196	108,093	191,427	17,244	40,810		1,632,698	21,667,725
2007	482,997	866,661	112,957	205,784	17,761	43,870		1,730,030	22,284,828
2008	497,486	931,661	118,040	221,218	18,294	47,160		1,833,860	22,867,576
2009	512,411	1,001,535	123,352	237,809	18,843	50,698		1,944,648	23,406,940
2010	527,783	1,076,650	128,903	255,645	19,408	54,500		2,062,889	23,892,701
2011	543,617	1,157,399	134,704	274,818	19,990	58,587		2,189,115	24,313,313
2012	559,925	1,244,204	140,765	295,429	20,590	62,981		2,323,896	24,655,763
2013	576,723	1,337,519	147,100	317,586	21,208	67,705		2,467,842	24,905,414
2014	594,025	1,437,833	153,719	341,405	21,844	72,783		2,621,610	25,045,825
2015	611,846	1,545,671	160,637	367,011	22,499	78,242		2,785,905	25,058,568
2016	630,201	1,661,596	167,865	394,537	23,174	84,110		2,961,483	24,923,011
2017	649,107	1,786,216	175,419	424,127	23,870	90,418		3,149,156	24,616,092
2018	668,580	1,920,182	183,313	455,936	24,586	97,199		3,349,797	24,112,062
2019	688,638	2,064,196	191,562	490,132	25,323	104,489		3,564,340	23,382,210
2020	709,297	2,219,010	200,183	526,891	26,083	112,326		3,793,790	22,394,560
2021	730,576	2,385,436	209,191	566,408	26,866	120,750		4,039,227	21,113,530
2022	752,493	2,564,344	218,604	608,889	27,672	129,807		4,301,808	19,499,573
2023	775,068	2,756,669	228,442	654,556	28,502	139,542		4,582,778	17,508,772
2024	798,320	2,963,420	238,722	703,647	29,357	150,008		4,883,473	15,092,399
2025	822,269	3,185,676	249,464	756,421	30,237	161,258		5,205,326	12,196,435
2026	846,937	3,424,602	260,690	813,152	31,145	173,353		5,549,879	8,761,043
2027	872,345	3,681,447	272,421	874,139	32,079	186,354		5,918,785	4,719,987
2028	898,516	3,957,555	284,680	939,699	33,041	200,331		6,313,822	0

INFORMATION REQUIRED BY AUDITORS

The information below and on the following page is required by the auditors in order to complete the financial statements for the Commonwealth. The Pension Benefit Obligation has been calculated in accordance with GASB Statement No. 5, and is a reflection of the system's status at the current time. The actuarial method which was used to determine these amounts is the Projected Unit Credit Cost Method, with salary increases. This method allocates an amount of benefit to each year of service, which is unlike the Entry Age Normal Cost Method, used in the valuation, which allocates a cost as a percent of salary to each year of service. See page 27 for more details on the Entry Age Normal Cost Method.

Pension expense as determined in accordance with APB Opinion No. 8 was also calculated using the Projected Unit Credit Cost Method.

A. GASB STATEMENT NO. 5 - ACTUARIAL INFORMATION

	<u>STATE</u>	<u>TEACHERS</u>	<u>BOSTON TEACHERS</u>	<u>COLA</u>	<u>TOTAL</u>
Projected Benefit Obligation as of 1/1/90 attributable to:					
1. Retirees and beneficiaries currently receiving benefits	\$ 2,759,870	\$2,233,292	\$247,568	\$1,721,040**	\$ 6,961,770
2. Terminated employees who have not yet received benefits or a return of contributions (inactives)	539,969	1,307,681	92,000*	—	1,939,650
3. Current employees (active members)					
a. Accumulated employee contributions with interest	1,409,141	1,509,312	121,070	0	3,039,523
b. Non-vested benefits financed by the Commonwealth	433,585	106,511	16,289	110,441	666,826
c. Vested benefits financed by the Commonwealth	<u>1,757,631</u>	<u>3,088,414</u>	<u>193,785</u>	<u>447,696</u>	<u>\$ 5,487,526</u>
Total Pension Benefit Obligation	\$6,900,196	\$8,245,210	\$670,712	\$2,279,177	\$18,095,295
Assets at Market Value	<u>3,741,394</u>	<u>3,797,088</u>	<u>275,080</u>	<u>0</u>	<u>7,813,562</u>
Unfunded Pension Benefit Obligation	\$ 3,158,802	\$4,448,122	\$395,632	\$2,279,177	\$10,281,733

*Same proportion of total actives as in State Teachers.

*Includes inactive members.

INFORMATION REQUIRED BY AUDITORS
(\$000's Omitted)

B. APB OPINION NO. 8 - PENSION EXPENSE

	STATE	TEACHERS	BOSTON TEACHERS	COLA	TOTAL
Normal Cost, 7/1/88	\$ 351,289	\$232,793	\$19,977	\$ 46,803	\$ 651,462
Amortization of 7/1/88 Unfunded Acc. Liability	+ 235,020	+331,608	+22,174	+160,553	+ 756,355
Total Pension Expense, 7/1/88	\$ 586,909	\$564,401	\$49,151	\$207,356	\$1,407,817
Interest to 6/30/89	+ 46,953	+ 45,152	+ 3,932	+ 16,588	+112,625
Total Pension Expense, 6/30/89	\$ 633,862	\$609,553	\$53,083	\$223,944	\$1,520,442
Actual FY89 Contributions (includes Employee Contributions)	- 463,201	-374,672	-31,795	- 94,928	- 964,596
FY89 Unpaid Pension Liability	\$ 170,661	\$234,881	\$21,288	\$129,016	\$ 555,846
Normal Cost, 7/1/89	\$ 380,040	\$251,416	\$21,575	\$ 50,547	\$ 703,578
Amortization of 7/1/88 Unfunded Acc. Liability	235,020	331,608	29,174	160,553	756,355
Amortization of Gain on Assets	+ (17,462)	+(15,314)	+(1,714)	+ 0	+ (34,490)
Total Pension Expense, 7/1/89	\$ 597,598	\$567,710	\$49,035	\$211,100	\$1,425,443
Interest to 6/30/90	47,808	45,417	3,923	16,888	114,036
Interest on FY89 Unpaid Pension Liability	+ 13,552	+ 18,790	+ 1,703	+ 10,321	+ 44,466
Total Pension Expense, 6/30/90	\$ 659,058	\$631,917	\$54,661	\$238,309	\$1,583,945
Actual FY90 Contributions (includes Employee Contributions)	- 484,166	-394,362	-32,793	- 82,599	- 993,920
FY90 Unpaid Pension Liability	\$ 174,892	\$237,555	\$21,868	\$155,710	\$ 590,025
Total Unpaid Pension Liability (FY89 + FY90)	\$ 345,553	\$472,436	\$43,156	\$284,726	\$1,145,871

NOTE: Opinion #8 requires the development of a funding schedule according to the level dollar amortization method. The funding schedule established pursuant to C.32, s.22C is based on the increasing amortization payment method. This explains the existence of an unpaid pension liability under Opinion #8.

SECTION VIII

SECTION VII

INFORMATION ON SYSTEM MEMBERSHIP

ASSETS

PART A: STATE EMPLOYEES (\$000's Omitted)

A critical element of an actuarial valuation is accurate and up-to-date membership information. In accordance with the STATE of the TEACHERS

A. Breakdown of Assets

Investment in the Treasurers' Masters Trust (market value)	\$2,609,875	\$2,344,830
Investment in the Pension Reserve Investment Trust (market value)	\$1,187,213	1,396,563
	\$3,797,088	\$3,741,393

B. Breakdown of Assets by Fund

Annuity Savings Fund)		
Annuity Reserve Fund)		
Military Service Fund)	\$2,609,875	\$2,344,830
Pension Fund)		
Pension Reserve Fund	\$1,187,213	\$1,396,563
	\$3,797,088	\$3,741,393

C. Assets for Boston Teachers

For Boston Teachers, we assumed that the portion of total assets to be allocated is the same proportion as was the case in the January 1, 1988 actuarial valuation (as of July 1, 1988) for the City of Boston.

	Years of Service								
	0-4	5-9	10-14	15-19	20-24	25-29	30+	TOTAL	
Total City of Boston assets (Market Value)								\$787,623	\$961,848
Assets allocated to Boston Teachers								\$225,253	\$275,080
25-29	7,561	2,741	127						10,429
30-34	6,410	3,219	2,263	38					11,930
35-39	4,957	4,630	4,063	913	65				14,628
40-44	4,213	3,876	3,924	2,458	899	37	3		15,210
45-49	2,892	2,703	2,317	1,804	1,186	300	43		11,245
50-54	1,849	1,882	1,767	1,336	1,018	318	244		8,307
55-59	1,326	1,358	1,491	1,398	1,044	345	444		7,854
60-64	807	1,188	1,289	1,285	964	342	613		6,488
65+	207	573	913	857	597	262	394		3,903
Total	33,545	24,522	17,953	-17-	17	5,553	1,836	1,741	94,942

SECTION VIII

SECTION VIII - (Continued)
INFORMATION ON SYSTEM MEMBERSHIP

PART A: STATE EMPLOYEES

A critical element of an actuarial valuation is accurate and up-to-date membership information. In recognition of this fact, PERA conducted an extensive review of existing data collection methods while also analyzing actual member information submitted as of 12/31/89 by the State Board of Retirement.

This analysis revealed that future data collection efforts would be enhanced by designing a New Member Enrollment Form. Such a form has been designed, and its use will ensure that new entries into the data base will be timely, complete and accurate.

With respect to the refinement of the existing database, PERA, the State Board of Retirement, and programmers in the Treasury Department devoted extensive effort in this area. This enormous task required numerous corrections and additions to incomplete information. Significant accomplishments have been realized, however, the work is ongoing.

Active Members

Number of Members	94,942		
Average Age	41.5		
Average Service	8.4		
Average Salary	\$29,501		

Age by Service Distribution of Active Members

Present	<u>Years of Service</u>							
<u>Age</u>	<u>0-4</u>	<u>5-9</u>	<u>10-14</u>	<u>15-19</u>	<u>20-24</u>	<u>25-29</u>	<u>30+</u>	<u>TOTAL</u>
20-24	3,323	154						3,477
25-29	7,561	2,741	127					10,429
30-34	6,410	5,219	2,263	39				13,931
35-39	4,957	4,630	4,062	913	66			14,628
40-44	4,213	3,876	3,924	2,458	699	37	3	15,210
45-49	2,892	2,703	2,317	1,804	1,186	300	43	11,245
50-54	1,849	1,882	1,567	1,336	1,019	310	244	8,207
55-59	1,326	1,556	1,491	1,398	1,044	345	444	7,604
60-64	807	1,188	1,289	1,285	964	342	613	6,488
65+	207	573	913	857	577	202	394	3,723
Total	33,545	24,522	17,953	10,090	5,555	1,536	1,741	94,942

SECTION VIII - (Continued)

INFORMATION ON SYSTEM MEMBERSHIP

PART A - STATE EMPLOYEES (Continued)

Salary by Age Distribution of Active Members

<u>Present Age</u>	<u>Number of Participants</u>	<u>Total Salary</u>	<u>Average Salary</u>
20-24	3,477	\$ 66,467,150	\$19,116
25-29	10,429	248,274,905	\$23,806
30-34	13,931	376,790,870	\$27,047
35-39	14,628	437,437,629	\$29,904
40-44	15,210	482,473,377	\$31,721
45-49	11,245	360,575,041	\$32,065
50-54	8,207	264,952,722	\$32,284
55-59	7,604	242,581,020	\$31,902
60-64	6,488	204,413,516	\$31,506
65+	3,723	116,885,281	\$31,395
Total	94,942	\$2,800,851,511	\$29,501
Total Employee Contributions made during 1989:			\$181,082,518

As discussed on Page 4 of this report, very little information is available for active employees hired prior to 1973. For those employees, we assumed that the age and service was distributed from ages 37 to 67 and with years of service from 17 years to 32 years, with the largest proportion being over age 50 with 20 to 30 years of service. Less than 1% of the remaining active data was missing Sex Code, Date of Birth, Date of Hire or Salary. In those few cases, we assumed the missing data was in the same pattern as the data which was present. For example, we assumed that 53% of the missing Sex Codes were F and 43% were M, which is the same proportion as found in the available data. We assumed employees are full time unless otherwise indicated. Two thirds of the members were assumed to be married with the male spouse three years older. Veteran Status was not available in about 25% of the records. In those cases, we assumed that 70% of the members were not veterans and 30% were veterans.

25-29	4,073	28,079,519	\$ 7,041
30-34	2,194	25,194,147	\$ 6,925
35-39	510	3,434,758	\$ 6,735
Total	6,777	\$56,708,424	\$ 8,369

The data had very few errors or missing information. In the few cases where assumptions were necessary, a best estimate was made based on the data available in that particular record.

SECTION VIII - (Continued)

INFORMATION ON SYSTEM MEMBERSHIP

PART A - STATE EMPLOYEES (Continued)

Vested Terminated Members

Number of Members	9,316
Average Age	66.7
Average Service	9.7
Average Annuity Savings Fund Account Balance	\$ 4,653
Average Final Salary	\$25,576

Much of the data was missing for those members who had terminated employment prior to December 31, 1989. We assumed that a member was vested if Date of Hire was prior to 1980, if Date of Birth was prior to 1934 or if the Annuity Savings Fund Balance was greater than \$25,000. (Blank Dates of Birth or Dates of Hire were excluded). Remaining information was inserted based upon the same rules as used for actives.

Retirees and Survivors

	Super.	Disabilities		Survivors	Total
		Acc	Ord		
Number of Members	27,158	2,126	906	5,637	35,827
Average Age	71.53	62.2	65.7	69.9	70.
Average Annual Benefit	\$ 9,322	\$ 14,260	\$ 9,944	\$ 5,768	\$ 9,069
Annuity Pension from	\$ 22,785,199	\$ 862,133	\$ 500,602	\$ 2,286,531	\$ 26,434,465
Commonwealth	230,098,648	29,455,895	8,503,812	30,205,139	298,263,494
Pension from Other Systems	293,206	787	5,027	19,739	228,759
Total	\$253,087,053	\$30,318,815	\$9,009,441	\$32,511,409	\$324,926,718

Benefit by Age Distribution

<u>Present Age</u>	<u>Number of Participants</u>	<u>Total Benefits</u>	<u>Average Benefits</u>
less than 40	127	\$ 1,237,053	\$ 9,741
40-45	220	2,639,817	\$ 11,999
46-49	403	5,130,005	\$ 12,730
50-54	634	7,604,142	\$ 11,994
55-59	1,482	16,325,599	\$ 11,016
60-64	3,859	44,234,620	\$ 11,463
65-69	7,601	82,059,532	\$ 10,796
70-74	8,406	72,565,610	\$ 8,633
75-79	6,318	45,821,848	\$ 7,253
80-84	4,073	28,679,549	\$ 7,041
85-89	2,194	15,194,145	\$ 6,925
90+	510	3,434,798	\$ 6,735
Total	35,827	\$324,926,718	\$ 9,069

Retiree data had very few errors or missing information. In the few cases where assumptions were necessary, a best estimate was made based on the data available in that particular record.

SECTION VIII (contd)

INFORMATION ON SYSTEM MEMBERSHIP

PART B: MASSACHUSETTS TEACHERS (Continued)

A critical element of an actuarial valuation is accurate and up-to-date membership information. In recognition of this fact, PERA conducted an extensive review of existing data collection methods while also analyzing actual member information submitted as of 12/31/89 by the Teachers' Board of Retirement.

This analysis revealed that future data collection efforts would be enhanced by designing a New Member Enrollment Form. Such a form has been designed, and its use will ensure that new entries into the data base will be timely, complete and accurate.

With respect to the refinement of the existing database, PERA, the Teachers' Board of Retirement, and programmers in the Treasury Department devoted extensive effort in this area. This enormous task required numerous corrections and additions to incomplete information. Significant accomplishments have been realized, however, the work is ongoing.

Active Members

Number of Members	3,547	61,415	147,512,692	\$41,964
Average Age		44.7		
Average Service	1,020	16.1	42,014,964	\$41,191
Average Salary		\$36,259		

Age by Service Distribution of Active Members

Present Age	0-4	5-9	10-14	15-19	20-24	25-29	30+	TOTAL
20-24	3							3
25-29	1,033	306						1,339
30-34	7,387	1,539	480					9,406
35-39	780	1,350	3,074	1,744				6,948
40-44	779	1,021	1,668	6,753	4,320			14,541
45-49	421	603	752	1,706	5,624	2,313		11,419
50-54	178	310	506	852	1,335	3,026	1,180	7,387
55-59	74	164	312	706	785	1,004	2,760	5,805
60-64	44	86	160	452	575	411	1,819	3,547
65+	3	37	60	120	205	140	455	1,020
Total	10,702	5,416	7,012	12,333	12,844	6,894	6,214	61,415

SECTION VIII (Continued)

INFORMATION ON SYSTEM MEMBERSHIP

PART B - MASSACHUSETTS TEACHERS (Continued)

Salary by Age Distribution of Active Members

<u>Present Age</u>	<u>Number of Participants</u>	<u>Total Salary</u>	<u>Average Salary</u>
20-24	3	\$ 83,276	\$27,759
25-29	1,339	34,002,114	\$25,394
30-34	9,406	250,636,913	\$26,646
35-39	6,948	234,182,037	\$33,705
40-44	14,541	539,143,475	\$37,077
45-49	11,419	447,611,897	\$39,199
50-54	7,387	294,959,092	\$39,929
55-59	5,805	236,697,568	\$40,775
60-64	3,547	147,512,692	\$41,588
65+	1,020	42,014,964	\$41,191
Total	61,415	\$2,226,844,028	\$36,259
Total Employee Contributions made during 1989:			\$148,680,032

Member data was not available for anyone hired after June, 1988, except for the amount of contributions in December of 1989. For those people, we assumed a Date of Birth of January 1, 1960 and a Date of Hire of January 1, 1989. This represents 6,098 records, or 9.9% of all active records. Less than 1% of the remaining active data was missing Sex Code, Date of Birth, Date of Hire or Salary. In those few cases, we assumed the missing data was in the same pattern as the data which was present. For example, we assumed that 65% of the missing Sex Codes were F and 35% were M, which is the same proportion as found in the available data. We assumed all employees are full time. Two thirds of the members were assumed to be married with the male spouse three years older. Since Veteran Status was not available, we assumed that 76% of the members were not veterans and 24% were veterans.

SECTION VIII (Continued)

INFORMATION ON SYSTEM MEMBERSHIP

PART B - MASSACHUSETTS TEACHERS (Continued)

Vested Terminated Members

Number of Members	10,589
Average Age	47.7
Average Service	20.0
Average Annuity Savings	
Fund Account Balance	\$19,000
Average Final Salary	\$36,780

Much of the data was missing for those members who had terminated employment prior to December 31, 1989. We assumed that a member was vested if Date of Hire was prior to 1980, if Date of Birth was prior to 1934 or if the Annuity Savings Fund Balance was greater than \$25,000. (Blank Dates of Birth or Dates of Hire were excluded). Remaining information was inserted based upon the same rules as used for actives.

Retirees and Survivors

	Super.	Disabilities		Survivors	Total
		Acc	Ord		
Number of Members	20,270	189	520	2,289	23,268
Average Age	72.5	60.2	62.3	68.7	71.
Average Annual Benefit	\$12,374	\$19,220	\$11,227	\$5,998	\$11,776
Annuity Pension from	\$22,412,651	\$152,760	\$431,974	\$1,258,907	\$24,256,292
Commonwealth	228,404,803	3,479,997	5,406,199	12,471,173	249,762,172
Total	\$250,817,454	\$3,632,757	\$5,838,173	\$13,730,080	\$274,018,464

Benefit by Age Distribution

Present Age	Number of Participants	Total Benefits	Average Benefits
less than 40	41	\$ 169,210	\$ 4,127
40-45	84	480,096	\$ 5,715
46-49	209	1,650,061	\$ 7,895
50-54	405	3,329,952	\$ 8,222
55-59	1,123	11,725,445	\$10,441
60-64	3,039	40,459,071	\$13,313
65-69	4,389	61,238,677	\$14,467
70-74	4,062	49,952,784	\$12,298
75-79	3,470	38,432,837	\$11,076
80-84	3,474	37,709,113	\$10,585
85-89	2,356	23,478,689	\$ 9,965
90+	606	5,392,529	\$ 8,899
Total	23,268	\$274,018,464	\$11,776

Retiree data had very few errors or missing information. In the few cases where assumptions were necessary, a best estimate was made based on the data available in that particular record.

INFORMATION ON SYSTEM MEMBERSHIPPART C - BOSTON TEACHERS - (Continued)

A critical element of an actuarial valuation is accurate and up-to-date membership information. In recognition of this fact, PERA conducted an extensive review of existing data collection methods while also analyzing actual member information submitted as of 12/31/89 by the Boston Board of Retirement.

This analysis revealed that future data collection efforts would be enhanced by designing a New Member Enrollment Form. Such a form has been designed, and its use will ensure that new entries into the data base will be timely, complete and accurate.

With respect to the refinement of the existing database, PERA, the Boston Board of Retirement, and programmers in the City of Boston Management Information Systems Department devoted extensive effort in this area. This enormous task required numerous corrections and additions to incomplete information. Significant accomplishments have been realized; however, the work is ongoing.

Active Members

Number of Members	5,057		
Average Age	46.1		
Average Service	13.3		
Average Salary	\$32,145		

Age by Service Distribution of Active Members

Present Age	Years of Service							TOTAL
	0-4	5-9	10-14	15-19	20-24	25-29	30+	
20-24	31							31
25-29	147	18						165
30-34	190	129	27	2				348
35-39	231	123	192	119	1			666
40-44	182	196	122	416	274	2		1,192
45-49	123	128	69	143	429	102		994
50-54	86	108	52	68	127	192	22	655
55-59	50	82	46	56	87	95	65	481
60-64	23	59	58	50	71	49	62	372
65+	11	33	30	14	21	13	31	153
Total	1,074	876	596	868	1,010	453	180	5,057

SECTION VIII (Continued)

INFORMATION ON SYSTEM MEMBERSHIPPART C - BOSTON TEACHERS - (Continued)Salary by Age Distribution of Active Members

<u>Present Age</u>	<u>Number of Participants</u>	<u>Total Salary</u>	<u>Average Salary</u>
20-24	31	\$ 377,984	\$12,193
25-29	165	3,641,505	\$22,070
30-34	348	9,628,667	\$27,669
35-39	666	20,706,816	\$31,091
40-44	1,192	41,520,788	\$34,833
45-49	994	34,191,998	\$34,398
50-54	655	21,555,083	\$32,909
55-59	481	15,247,403	\$31,699
60-64	372	11,492,815	\$30,895
65+	153	4,194,527	\$27,415
Total	5,057	\$ 162,557,586	\$32,145
Total Employee Contributions made during 1989:			\$ 9,837,766

Less than 1% of the active data was missing Sex Code, Date of Birth, Date of Hire or Salary. In those few cases, we made an estimate based on the data available in the particular record. We assumed all employees are full time unless otherwise indicated. Two thirds of the members were assumed to be married with the male spouse three years older. We assumed that members were not veterans unless otherwise indicated.

SECTION VIII (Continued)

INFORMATION ON SYSTEM MEMBERSHIP

PART C - BOSTON TEACHERS (Continued)

Vested Terminated Members

Data was not available for members who had terminated employment prior to December 31, 1989, but who left their contributions in the system. For purposes of the valuation, we assumed that the liabilities for these people were in the same proportion to active employees as was the case for State Teachers.

Retirees and Survivors

	<u>Disabilities</u>				<u>Survivors</u>	<u>Total</u>
	<u>Super.</u>	<u>Acc</u>	<u>Ord</u>			
Number of Members	1,908	57	49		114	2,128
Average Age	74.9	61.4	65.8		68.1	73.
Average Annual Benefit	\$15,474	\$20,050	\$12,778		\$7,119	\$15,087
Annuity	\$ 2,459,417	\$ 38,720	\$ 37,770		\$ 77,350	\$ 2,613,257
Pension from Commonwealth	27,065,361	1,104,169	588,375		734,232	29,492,137
Total	\$29,524,778	\$1,142,889	\$ 626,145		\$ 811,582	\$ 32,105,394

Benefit by Age Distribution

<u>Present Age</u>	<u>Number of Participants</u>	<u>Total Benefits</u>	<u>Average Benefits</u>
less than 40	3	\$ 18,557	\$ 6,186
40-45	5	69,351	\$13,870
46-49	14	160,914	\$11,494
50-54	22	332,418	\$15,110
55-59	68	796,599	\$11,715
60-64	196	3,399,083	\$17,342
65-69	360	6,835,418	\$18,987
70-74	372	5,889,129	\$15,831
75-79	330	4,749,020	\$14,391
80-84	422	5,895,961	\$13,971
85-89	266	3,220,992	\$12,109
90+	70	737,592	\$10,542
Total	2,128	\$ 32,105,394	\$15,087

Retiree data had very few errors or missing information. In the few cases where assumptions were necessary, a best estimate was made based on the data available in that particular record.

C. Valuation Method for CDIA

The costs and liabilities for the CDIA were based on the January 1, 1987 valuation. Normal cost was assumed to be the same as those projected in that valuation report. The Unfunded Actuarial Liability was brought forward assuming there were no gains or losses.

SECTION IX

VALUATION COST METHODS

A. Actuarial Cost Method

The Actuarial Cost Method which was used to determine pension liabilities and costs for benefits payable under the State Employees' Contributory Retirement System for the year beginning January 1, 1990, is known as the Entry Age Normal Cost Method. Under this method the Normal Cost for each active participant on the valuation date is determined as the level percent of salary, which, if paid annually from the date the participant first became a member of the retirement system, would fully fund by retirement, death, disability or termination, the projected benefits which the participant is expected to receive. The Actuarial Liability for each participant is determined as the present value as of the valuation date of all projected benefits which the participant is expected to receive, minus the present value of future annual Normal Cost payments expected to be made to the fund. Since only active members have a Normal Cost, the Actuarial Liability for inactive, retirees and survivors is simply equal to the present value of all projected benefits. The sum of Normal Cost and Actuarial Liability for each participant is equal to the Normal Cost and Actuarial Liability for the Plan. The Unfunded Actuarial Liability is the Actuarial Liability minus current assets.

The Normal Cost for a participant will remain a level percent of salary for each year of participation except for changes in provisions of the Plan or the actuarial assumptions employed in projection of benefits and present value determinations. The Normal Cost for the entire system will also change due to addition of new participants or the retirement, death or termination of participants. The Actuarial Liability for a participant will increase each year to reflect the additional accrual of Normal Cost. It will also change if the Plan provisions or actuarial assumptions are changed.

Differences each year between the actual experience of the Plan and the experience projected by the actuarial assumptions are reflected by adjustments to the Unfunded Actuarial Liability. An experience difference which increases the Unfunded Actuarial Liability is called an Actuarial Loss and one which decreases the Unfunded Actuarial Liability is called an Actuarial Gain.

B. Asset Valuation Method

Assets have been valued at market value. See page 17 for details on the allocation of assets for Boston Teachers.

C. Valuation Method for COLA

The costs and liabilities for the COLA were based on the January 1, 1987 valuation. Normal cost was assumed to be the same as those projected in that valuation report. The Unfunded Actuarial Liability was brought forward assuming there were no gains or losses.

ACTUARIAL ASSUMPTIONS

SECTION X

ACTUARIAL ASSUMPTIONS

<u>Rate of Investment Return</u>		Other	8% per year
<u>Rate of Salary Increase</u>	Age	All Teachers	Groups 1 & 2
	20	.0000	.0000
	30	.0000	.0000
	40	.0000	.0000
	50	.0000	.0000
<u>Rate of Inflation</u>			4 1/2 % per year
<u>Interest Rate credited to the Annuity Savings Fund</u>			5 1/2% per year
<u>Assumed Rate of Cost of Living Increases (COLA)</u>			3% per year

Mortality Rate

Based on an analysis of past experience, annual rates are shown below:

1971 Group Annuity Mortality Table with ages set back one year for non-disabled males and set back six years for non-disabled females. A one-year setback means that members are assumed to die at an age one year later than would be the case under the table with no setback. The purpose of this is to reflect the improvement in mortality since 1971. This is applicable to both pre-retirement and post-retirement benefits. For disabled members, mortality is assumed to be in accordance with the 1971 Group Annuity Mortality Table set forward nine years for males and set forward four years for females. It is assumed that 55% of pre-retirement deaths are job-related. For members retired under an Accidental (job-related) Disability, it is assumed that 40% of deaths are from the same cause as the disability.

Rate of Withdrawal

Based on an analysis of past experience. Sample annual rates are shown below:

Age	Other		
	Teachers	Groups 1 & 2	Groups 3 & 4
20	.0960	.1200	.0210
30	.0444	.0555	.0165
40	.0185	.0231	.0056
50	.0117	.0146	0

ACTUARIAL ASSUMPTIONS

SUMMARY OF PLAN PROVISIONS

Rate of Disability

Based on an analysis of past experience.
Sample annual rates are shown below:

Age	All Teachers	Other	
		Groups 1 & 2	Groups 3 & 4
20	.0003	.0006	.0010
30	.0006	.0011	.0023
40	.0012	.0024	.0087
50	.0031	.0061	0
60	.0061	.0123	0

It is also assumed that 55% of disabilities will be job-related.

Rate of Retirement
(Superannuation)

Based on an analysis of past experience.
Annual rates are shown below:

Age	Teachers		
	Groups 1 & 2	Group 3	Group 4
50	1.0000	1.0000	.3201
51	1.0000	1.0000	.0718
52	1.0000	1.0000	.0593
53	1.0000	1.0000	.0803
55	1.0000	1.0000	.0769
55	.1255	1.0000	.1554
56	.0321	1.0000	.0907
57	.0310	1.0000	.0909
58	.0334	1.0000	.1194
59	.0348	1.0000	.1136
60	.0784	1.0000	.2395
61	.0692	1.0000	.1360
62	.1511	1.0000	.1950
63	.1071	1.0000	.1253
64	.1037	1.0000	.1873
65	.3568	1.0000	1.0000
66	.2214	1.0000	1.0000
67	.2159	1.0000	1.0000
68	.2164	1.0000	1.0000
69	.2536	1.0000	1.0000
70	1.0000	1.0000	1.0000

Note: For Group 3 members, retirement is assumed to occur on the later of attainment of age 50 or completion of 20 years of service.

Administrative Expenses

Assumed to be paid separately and are not included in the appropriation.

Credited Service

Members are assumed to buy back the period of service between Date of Hire and Date of Membership, if any.

Assumptions made with respect to data are discussed in Section VIII.

SECTION XI

SUMMARY OF PLAN PROVISIONS

SUMMARY OF PLAN PROVISIONS

ADMINISTRATION: There are 106 contributory retirement systems for public employees in Massachusetts. Each system is governed by a retirement board and all boards, although operating independently, are bound together under one retirement law, Chapter 32, of the Massachusetts General Laws. This law in general provides uniform benefits, uniform contribution requirements and a uniform accounting and funds structure for all systems.

PARTICIPATION: Participation is mandatory for all full-time employees whose employment commences prior to age 65. Eligibility with respect to part-time, provisional, temporary or intermittent employment is governed by the retirement board. Membership is optional for certain elected officials and certain state officials appointed by the governor.

There are 4 classes of membership in the retirement system:

Group 1 - general employees, including teachers, clerical, administrative, technical and all other employees not otherwise classified.

Group 2 - Certain specified hazardous duty positions.

Group 3 - State Police Officers and Inspectors.

Group 4 - Municipal police officers, firefighters, state correction officers and registry police and other specified hazardous positions.

MEMBER CONTRIBUTIONS: Member contributions vary depending on the date of membership:

Prior to 1975 - 5% of regular compensation

1975 - 1983 - 7% of regular compensation

1984 to present - 8% of regular compensation

Individuals whose membership became effective on or after January 1, 1979, contribute an additional 2% of regular compensation over \$30,000.

RATE OF INTEREST: Regular Interest on regular deductions made after January 1, 1984 is a rate established by the Commissioner of PERA in consultation with the Commissioner of Banks. The rate is obtained from the average rates paid on individual savings accounts by a representative sample of at least 10 financial institutions.

SECTION XI (Continued)

SUMMARY OF PLAN PROVISIONS

RETIREMENT AGE: The maximum retirement age for Group 4 employees is age 65. There is no maximum retirement age for employees in Group 1. Group 1 employees may remain in service after age 70 upon completion of an annual physical which determines that the member is capable of performing the duties of his or her position.

Members over the age of 70 may elect to continue making contributions on regular compensation and continue to accrue additional years of creditable service.

SUPERANNUATION RETIREMENT: An employee is eligible for a superannuation retirement allowance (or service retirement), upon meeting the following conditions:

- *completion of 20 years of service, or
- *attainment of age 55 if hired prior to 1978, or if classified in group 4, or
- *hired after 1978, with 10 years of service and age 55, or
- *attainment of age 50 if classified in Group 3

AMOUNT OF BENEFIT: An employees' annual pension is determined by multiplying average salary by a benefit rate related to the members age and job classification at retirement, and the resulting product by his creditable service. For veterans as defined in M.G.L. c. 32 s. 1, there is an additional benefit of \$15 per year for each year of service, up to a maximum of 20 years. The amount determined by the benefit formula cannot exceed 80% of the employees' average salary.

For Group 3 members, an allowance will be equal to one-half of the average annual rate of regular compensation received during the 12 month period immediately preceding the retirement date, with an increase of $1/12$ of 1% for each full month of service in excess of 20 years.

Salary is defined as gross regular compensation.

Average Salary is the average of pay during the 3 consecutive years that produce the highest average, or, if greater, during the last three years (whether or not consecutive) preceding retirement.

The Benefit Rate varies with the employees' retirement age, but the highest rate of 2.5% applies to Group 1 employees who retire on or after age 65, and to Group 4 employees who retire on or after age 55. A .1% reduction is applied for each year of age under the maximum age for the members group.

SECTION XI (Continued)

SUMMARY OF PLAN PROVISIONS

DEFERRED VESTED BENEFIT: A participant who has completed 10 or more years of creditable service is eligible for a deferred vested retirement benefit. If termination is involuntary in accordance with M.G.L. c. 32 s. 10, a participant may be vested after 6 years.

The participant's accrued benefit is payable commencing at age 55, or the completion of 20 years, or may be deferred until later at the participant's option.

WITHDRAWAL OF CONTRIBUTIONS: If a member is under age 55, member contributions may be withdrawn. Employees who first become members on or after January 1, 1984, may receive only limited interest on their contributions. Those who leave service with less than 5 years receive no interest; those who leave service with greater than 5 but less than 10 years receive 50% of interest.

COST OF LIVING: The first \$9,000 of a retiree's total allowance is subject to a cost-of-living adjustment related to a change of at least 3% in the Consumer Price Index. This benefit is subject to an annual vote of the Massachusetts General Court. The total Cost-of-Living adjustment for periods after 1982 is paid for by the Commonwealth of Massachusetts.

DISABILITY RETIREMENT: The Massachusetts Retirement Plan provides 2 types of disability retirement benefits:

Ordinary Disability:

Eligibility: Non-veterans prior to age 55 with 10 years of service or veterans with 10 years of creditable service prior to reaching maximum retirement age, who become totally and permanently disabled by reason of a non-job related disability.

Retirement Allowance: Equal to the accrued retirement benefit as if the member was age 55. If the member is a veteran, the benefit is 50% of the member's final rate of salary during the preceding 12 months, plus an annuity based upon accumulated member contributions plus credited interest. If the member is over age 55 he or she will receive not less than the superannuation allowance to which he or she is entitled.

SECTION XI (Continued)

SUMMARY OF PLAN PROVISIONS

Accidental Disability:

Eligibility: Applies to members who become permanently and totally incapacitated for further duty as a result of a personal injury sustained or hazard undergone while in the performance of duties. There are no minimum age or service requirements.

Retirement Allowance: 72% of salary plus an annuity based on accumulated member contributions, with interest. In addition, a dependent allowance of \$450 per year subject to Cost-of Living increases granted by the legislature, per dependent child, up to age 18, 21 if a full time student, with no age limitation if the child is mentally or physically handicapped. The total allowance is not to exceed 100% of pay. (75% for members hired after 1987)

ACCIDENTAL DEATH

Eligibility: Applies to members who die as a result of an occupational injury or if the member was retired for accidental disability and the death was the natural and proximate result of the injury or hazard undergone on account of which such member was retired.

Allowance: An immediate payment equal to the accumulated deductions at the time of death, plus a pension equal to 72% of current salary and payable to the surviving spouse, dependent children or the dependent parent, plus a supplement of \$312 per year, per child, payable to the spouse or legal guardian until all dependent children reach age 18 or 21 if a full time student, unless handicapped.

DEATH AFTER ACCIDENTAL DISABILITY RETIREMENT

If the member's death is from a cause unrelated to the condition for which the member received accidental disability benefits, the spouse will receive an annual allowance of \$3,000 until remarriage or death.

DEATH IN ACTIVE SERVICE:

Eligibility: At least 2 years of service

Allowance: An immediate allowance equal to that which would have been payable had the member retired and elected Option C on the day before his or her death. For death occurring prior to the member's superannuation retirement age, the age 55 and age 45 benefit rates are used, respectively for Group 1 and Group 4 members.

SECTION XI (Continued)

SUMMARY OF PLAN PROVISIONS

ACTUARIAL ACCRUED LIABILITY

For members with at least 2 years of service at death, the surviving spouse receives an additional allowance equal to the sum of \$1440 per year for the first child and \$1080 per year for each additional child.

METHODS OF PAYMENT

An employee may elect to receive his or her retirement allowance in one of 3 optional forms of payment

Option A: Total annual allowance, payable in monthly installments, commencing at retirement and terminating at the employee's death.

Option B: A reduced annual allowance, payable in monthly installments, commencing at retirement and terminating at the death of the employee, provided, however, that if the total amount of the annuity portion received by the employee is less than the amount of his or her accumulated deductions, including interest, the difference or balances of his accumulated deductions will be paid to the member's beneficiary of choice.

Option C: A reduced annual allowance, payable in monthly installments, commencing at retirement, and at the death of the retired employee, 2/3 of the pension payable to the member's designated beneficiary (who may be the spouse, child, parent, sister, or brother of the employee) for the life of the beneficiary. If the beneficiary pre-deceases the retiree, the benefit payable increases (or pops-up) to the amount which would have been payable under Option A. Option C is not available to accidental disability recipients.

ALLOCATION OF PENSION COSTS: If an employee's total creditable service was partly earned by employment in more than 1 municipality, authority of state agency, (thus more than one retirement system) the cost of the "pension portion" is allocated between the different systems pro rata based on the employee's service within each retirement system.

That portion of the pension plan appropriation which represents payments made to pay interest on and the reduction of the Unfunded Accrued Liability. The Unfunded Liability as of January 1, 1987 is amortized separately from each Actuarial Gain or Loss or change that must be made up of the Unfunded Accrued Liability in subsequent years.

SECTION XII

GLOSSARY OF TERMSACTUARIAL ACCRUED LIABILITY

That portion of the Actuarial Present Value of pension plan benefits which is not provided by future Normal Costs or employee contributions. It is the portion of the Actuarial Present Value attributable to service rendered as of the Valuation Date.

ACTUARIAL ASSUMPTIONS

Assumptions, based upon past experience, used to predict the occurrence of future events affecting the amount and duration of pension benefits, such as: mortality, withdrawal, disablement and retirement; changes in compensation; rates of investment earnings and asset appreciation or depreciation; and any other relevant items.

ACTUARIAL COST METHOD (or FUNDING METHOD)

A procedure for allocating the Actuarial Present Value of all past and future pension plan benefits to the Normal Cost and the Actuarial Accrued Liability.

ACTUARIAL GAIN OR LOSS (or EXPERIENCE GAIN or LOSS)

A measure of the difference between actual experience and that expected based upon the set of Actuarial Assumptions, during the period between two Actuarial Valuation dates.

Note: The effect on the Accrued Liability and/or the Normal Cost resulting from changes in the Actuarial Assumptions, the Actuarial Cost Method or pension plan provisions would be described as such, not as an Actuarial Gain (Loss).

ACTUARIAL PRESENT VALUE

The dollar value on the valuation date of all benefits expected to be paid to current members based upon the Actuarial Assumptions and the terms of the Plan.

AMORTIZATION PAYMENT

That portion of the pension plan appropriation which represents payments made to pay interest on and the reduction of the Unfunded Accrued Liability. The Unfunded Liability as of January 1, 1987 is amortized separately from each Actuarial Gain or Loss or change that goes to make up the Unfunded Accrued Liability in subsequent years.

SECTION XII (Continued)

GLOSSARY OF TERMS

ANNUITY SAVINGS FUND

The fund in which employee contributions plus interest credited are held for active members and for terminated members who have not withdrawn their contributions and are not yet receiving a benefit (inactive members).

ANNUITY RESERVE FUND

The fund into which total accumulated deductions, including interest, is transferred at the time a member retires, and from which annuity payments are made.

COMMONWEALTH'S PENSION LIABILITY FUND

The fund into which is paid the appropriation made by the Commonwealth in accordance with the most recent Funding Schedule plus any additional appropriation as recommended by the Governor.

COST OF BENEFITS

The estimated payment from the pension system for benefits for the fiscal year. This is the minimum amount payable during the first ten years of the Funding Schedule.

EXPENSE FUND

The fund into which the appropriation for administrative expenses is paid and from which all such expenses are paid.

FUNDING SCHEDULE

The schedule based upon the most recently approved actuarial valuation which sets forth the amount to be appropriated to the pension system, excluding administrative expenses, in accordance with Section 22C of M.G.L. Chapter 32.

UNFUNDED ACCRUED LIABILITY

The excess of the Actuarial Accrued Liability over the Assets

SECTION XII (Continued)

GLOSSARY OF TERMS

GASB

Governmental Accounting Standards Board

NORMAL COST

Total Normal Cost is that portion of the Actuarial Present Value of pension plan benefits which is to be paid in a single fiscal year. The Employee Normal Cost is the amount of the expected employee contributions for the fiscal year. The Employer Normal Cost is the difference between the total Normal Cost and the Employee Normal Cost.

PENSION BENEFIT OBLIGATION

The portion of the Actuarial Present Value attributable to past service in accordance with the Projected Unit Credit cost method as stipulated by GASB Statement Number 5.

PENSION FUND

The fund into which amounts from the Commonwealth's Pension Liability Fund are transferred and from which pension benefits are paid.

PENSION RESERVE FUND

The fund which is credited with all amounts set aside for the purpose of meeting future pension liabilities, including excess interest earnings. On January 12, 1988, this became the Commonwealth's Pension Liability Fund.

SPECIAL FUND FOR MILITARY SERVICE CREDIT

The fund which is credited with amounts paid by the Commonwealth equal to the amount which would have been contributed by a member during a military leave of absence as if the member had remained in active service. In the event of retirement or a non-job related death, such amount is transferred to the Annuity Reserve Fund. In the event of termination prior to retirement or death, such amount shall be transferred to the Pension Fund.

UNFUNDED ACCRUED LIABILITY

The excess of the Actuarial Accrued Liability over the Assets.