

MASS. RLI. 2: C183/1979



✓

COMPOSITE ACTUARIAL

# VALUATION REPORT

OF

THE CONTRIBUTORY RETIREMENT SYSTEMS

OF



THE COMMONWEALTH OF MASSACHUSETTS  
as of JANUARY 1, 1979

GOVERNMENT DOCUMENTS  
COLLECTION

JUN 2 1983

University of Massachusetts  
Depository Copy

Retirement Law Commission

1 ASHBURTON PLACE, BOSTON, MASS. 02108

822/158





# *The Commonwealth of Massachusetts*

## *Retirement Law Commission*

*One Ashburton Place*

*Boston, Massachusetts 02108*

March, 1982

Mr. Wallace C. Mills  
Clerk of the House of Representatives  
State House  
Boston, MA 02133

The Retirement Law Commission herewith presents to the Honorable Governor and to the Legislature of the Commonwealth of Massachusetts the Annual Report of said Commission.

The principle focus of the Commission's activities in 1980 was the presentation of the Actuarial Valuation Report of the Contributory Retirement Systems of the Commonwealth of Massachusetts.

This report was the result of a two year study made for the Commission by William M. Mercer, Incorporated, an international actuarial consulting firm. Data was collected from a total of 100 state and local retirement systems, encompassing 276,000 active members with a payroll of \$3.3 billion and 85,000 retired members receiving approximately \$400 million in annual pension payments. The Commission had previously provided an individual actuarial valuation report to each of the 100 systems studied. The last study of this type was released in 1977.

The unfunded actuarial liability of the system was shown to be \$9.1 billion, compared to \$7.4 billion in the previous study. However, the 1981 report also developed the unfunded liability by the method now recommended for financial disclosure by the Financial Accounting Standards Board at \$7.6 billion for all pensions earned to date by the systems' members, and at \$7.0 billion for all vested pensions earned to date.

The Commission had previously recommended a five year phase-in program for fully funding the state's retirement systems, and this report showed that several cities and towns had voluntarily started such a program. In addition, the state had set aside \$123 million for funding its two major systems covering state employees and teachers.



All valuation results were allocated between the state employees', teachers', City of Boston and all others. The state and teachers' share of the \$7.6 billion unfunded liability for pensions earned to date was approximately \$1.8 billion each. Boston's share was \$1.2 billion, part of which represents teachers' pensions which are the responsibility of the state. The other cities, towns, counties and separate agencies made up the remaining \$2.8 billion.

Participant data on membership in the system as of January 1, 1979 formed the basis for the study. The report took nearly two years to complete due to the detailed collection and verification procedures used to insure the accuracy of the data. As a result, membership data was found to be far more complete and accurate than in any similar studies done in previous years. The two major state systems and 84 of the 98 "local" systems had their data brought up to an accuracy level of between 90% and 100% complete. The valuation results for the remaining 14 systems were adjusted in the final report to account for missing data. The actuarial firm in its report emphasized the importance of maintaining a complete and up-to-date data bank on active and retired members of the systems.

The report did not take into account the effect of the 1978 court reform legislation which transferred the responsibility for court personnel from the counties to the state. The actual transfer of records for court employees was accomplished after the January 1, 1979 effective date for collection of membership information.

The actuary's report attributed the increase in the unfunded liability since the last study to several factors, including the more complete and accurate data used in the latest study. Other reasons included a slightly more conservative investment return assumption (7% instead of 7½%), more accurate statistics on the ages at which members actually retire, and the lack of adequate advance funding during the period. Although the total payroll of all systems' members increased only 15% from 1976 to 1979, there was considerable variation among the individual systems, with some local systems witnessing payroll increases of 30% to 40% while the Teachers' system payroll only increased by 3%.

The data collected for this study also permitted breakdowns of valuation results by units within a system. Retirement Boards which requested and received breakdowns of this type included Berkshire County, Essex County, Worcester County, the City of Fall River and the Town of Wellesley.




The data bank also formed the basis for other important studies which were completed during the two-year period. Among these was a study of the effect of using accrued sick leave pay and early retirement incentive bonuses to compute teachers' pensions, an issue in litigation at the time, and an analysis of the state's obligation in providing cost-of-living increases to retired members of all state and local systems as the state was forced to do because of Proposition 2½. The Commission was also able to respond to various requests for information from the legislature, including furnishing information on pension liabilities for the Pondville Hospital which was sold by the state to Norwood Hospital in 1981.

The Retirement Law Commission provided the calculations of the actuarial reserve valuation of annuity benefits under the Massachusetts Contributory Retirement Law to the Division of Insurance.

The Commission prepared a tabulation for each of the 102 retirement systems showing the annuity reserve for each retired member as of 1979 and the total for all such members.

The Legislature and the Governor have forwarded many additional requests to the Commission. In most cases the Retirement Law Commission is able to supply this information within seven days of the initial request.

Respectfully yours,



Carmen W. Elio  
Chairman



Digitized by the Internet Archive  
in 2014

<https://archive.org/details/compositeactuari979mass>



COMPOSITE  
ACTUARIAL VALUATION REPORT  
OF  
THE CONTRIBUTORY RETIREMENT SYSTEMS OF  
THE COMMONWEALTH OF MASSACHUSETTS  
AS OF JANUARY 1, 1979



TABLE OF CONTENTS

HIGHLIGHTS. . . . . 1

SECTION 1 - SUMMARY OF VALUATION RESULTS. . . . . 4

    SECTION 1.1 - CONTRIBUTIONS . . . . . 5

    SECTION 1.2 - CONTRIBUTION PROJECTIONS. . . . . 7

    SECTION 1.3 - ASSETS AND ACTUARIAL LIABILITIES. . . . . 14

    SECTION 1.4 - FINANCIAL DISCLOSURE. . . . . 16

    SECTION 1.5 - COMMENTARY. . . . . 19

SECTION 2 - BASIS OF VALUATION. . . . . 22

    SECTION 2.1 - SUMMARY OF BENEFIT PROVISIONS . . . . . 23

    SECTION 2.2 - MEMBERSHIP DATA . . . . . 27

    SECTION 2.3 - ACTUARIAL BASIS . . . . . 30

SECTION 3 - APPENDICES

    APPENDIX A - TABULATION OF THE  
                100 CONTRIBUTORY RETIREMENT SYSTEMS. . . . . 36

    APPENDIX B - TABULATION OF THE 13 CONTRIBUTORY RETIREMENT  
                SYSTEMS WITH CONTRIBUTIONS UNDER CHAPTER 559  
                OF THE ACTS OF 1977. . . . . 37



## HIGHLIGHTS

William M. Mercer has prepared, at the direction of the Massachusetts Retirement Law Commission, an actuarial valuation for 100 Contributory Retirement Systems of the Commonwealth of Massachusetts as of January 1, 1979. This Composite Report summarizes the results of those actuarial valuations.

The purpose of the valuations is to enable the Commission to respond to certain gubernatorial and legislative requests to perform studies and analyses of the pension benefits being paid by the Commonwealth of Massachusetts, its political subdivisions and its instrumentalities under the various statutes authorizing such pensions.

Section 1 contains the results of the actuarial valuations. The total contribution requirements shown in Section 1.1 for the systems to fund for future benefit obligations consist of a normal cost element and an amortization of the unfunded actuarial liability over a forty-year period beginning on January 1, 1979, both expressed as a level percentage of covered payroll. The average funding contribution developed in the valuations was as follows, based on a total January 1, 1979 payroll of \$3,307,519,000:

	<u>% of Payroll</u>	<u>1979 Amount</u>
Normal cost	12.9%	\$427,164,000
Amortization cost	<u>10.9%</u>	<u>\$361,462,000</u>
Total	23.8%	\$788,626,000

Section 1.2 shows the funding cost assuming a five-year phase-in to full actuarial funding beginning in the 1980-81 fiscal year. The Funding Advisory Committee formed in 1974 recommended such a phase-in to full actuarial funding. The average funding contribution developed for the first five years on this phase-in basis was calculated to be as follows:

<u>Fiscal Year</u>	<u>% of Payroll</u>	<u>Projected Amount</u>
1980-81	18.0%	\$ 650,884,000
1981-82	20.0	755,221,000
1982-83	21.3	840,297,000
1983-84	22.9	943,523,000
1984-85	24.9	1,072,023,000

The percentage of payroll cost was projected to remain constant at 24.9% through fiscal year 2019-20.



Section 1.2 also summarizes the projected pay-as-you-go contribution requirements for fiscal years 1981 through 2000 and compares these requirements to the funding contribution on the five-year phase-in schedule.

Chapter 559 of the Acts of 1977 provided that cities, towns and districts may appropriate additional funds and hold and invest such funds in a special account for purposes of funding the retirement obligations in advance. All of the valuation results shown in this section and elsewhere in the report take into account\* that certain systems have already established such accounts and have appropriated and contributed to such funds in fiscal years prior to 1980-81, and that such systems are partially through the five-year phase-in period by fiscal 1980-81.

Section 1.3 summarizes the assets and actuarial liabilities of the 100 systems studied.

Section 1.4 shows the actuarial value and unfunded actuarial value of accrued vested benefits and total accrued benefits calculated in accordance with Statement No. 35 of the Financial Accounting Standards Board to be as follows:

	<u>Accrued Vested Benefits</u>	<u>Total Accrued Benefits</u>
Actuarial value	\$9,585,761,000	\$10,134,027,000
Assets - statutory value	<u>2,554,274,000</u>	<u>2,554,274,000</u>
Unfunded actuarial value	\$7,031,487,000	\$ 7,579,753,000

Section 1.5 is a commentary on the results of the 100 actuarial valuations prepared for and presented to the Massachusetts Retirement Law Commission which form the basis for the summarized results shown in this Composite Report.

Section 2 describes the basis of the valuation. The eligibility and benefit provisions of Chapter 32 which were used to make the actuarial calculations are summarized in this section. A description and summarization of the membership data and any adjustments to the raw data to make it usable for purposes of the actuarial valuations are described in this section. Finally, the actuarial cost method and actuarial assumptions are stated and explained.

\* Except for funding contributions by towns which are members of a county retirement system.





A complete list of the 100 systems included in this report can be found in Appendix A.

A complete list of thirteen systems reported to have made contributions under Chapter 559 of the Acts of 1977 in the 1979 and 1980 fiscal years can be found in Appendix B.

The undersigned are available to provide further information or answer any questions with respect to this report.

\_\_\_\_\_  
Date Signed

\_\_\_\_\_  
William J. McDonnell, A.S.A., M.A.A.A.  
Vice President

\_\_\_\_\_  
Date Signed

\_\_\_\_\_  
Gail L. Sumner, M.A.A.A.  
Assistant Vice President



## SECTION 1

### SUMMARY OF VALUATION RESULTS

This section sets forth the results of the actuarial valuation.

Section 1.1 shows the contributions required to fund the systems on a level basis starting on the valuation date.

Section 1.2 summarizes the twenty-year projection of pay-as-you-go and funding costs.

Section 1.3 summarizes the assets, actuarial liabilities and unfunded actuarial liabilities of the systems.

Section 1.4 shows the actuarial value and unfunded actuarial value of accrued vested benefits and total accrued benefits.

Section 1.5 is a commentary on the valuation results.

Actuarial liabilities designated for "active members" include member contribution accounts for inactive members who have not withdrawn their contributions. Actuarial liabilities designated for "retired members" include liabilities for beneficiaries receiving retirement payments.



## SECTION 1.1

### CONTRIBUTIONS

This section summarizes the level of contributions required for full actuarial funding starting on January 1, 1979.

The two cost components, employer normal cost and amortization of unfunded actuarial liability, are described in detail in Section 2.3.

Total annual employer cost is shown on two bases.

The first basis includes an amortization of the unfunded actuarial liability over a 40-year period beginning on January 1, 1979 as a level dollar amount. This is the procedure required for private pension plans by the Employee Retirement Income Security Act of 1974. When level dollar amortization is used, the total employer cost will normally decrease as a percentage of payroll in future years as payroll increases.

The second basis includes an amortization of the unfunded actuarial liability over a 40-year period beginning on January 1, 1979 as a level percentage of future payroll. This procedure is frequently used in funding public retirement systems. Since the normal cost component is also determined to remain level as a percentage of future payroll, the total employer cost under this procedure will remain level as a percentage of future payroll if all actuarial assumptions are exactly realized.



SECTION 1.1

CONTRIBUTIONS (cont'd)

	State	Teachers	Boston	Other Local Boards	Total
Total payroll	\$930,924,000	\$912,530,000	\$348,299,000	\$1,115,766,000	\$3,307,519,000
Normal cost - employer	\$117,296,000 (12.6%)	\$ 90,340,000 ( 9.9%)	\$ 44,930,000 (12.9%)	\$ 174,598,000 (15.6%)	\$ 427,164,000 (12.9%)
Normal cost - employees	<u>52,358,000 ( 5.6%)</u>	<u>48,612,000 ( 5.3%)</u>	<u>18,185,000 ( 5.2%)</u>	<u>60,030,000 ( 5.4%)</u>	<u>179,185,000 ( 5.4%)</u>
Total normal cost	\$169,654,000 (18.2%)	\$138,952,000 (15.2%)	\$ 63,115,000 (18.1%)	\$ 234,628,000 (21.0%)	\$ 606,349,000 (18.3%)
Total annual employer cost - normal cost plus 40-year amortization of unfunded actuarial liability as					
level dollar amount	\$268,720,000 (28.9%)	\$262,689,000 (28.8%)	\$145,320,000 (41.7%)	\$ 417,658,000 (37.4%)	\$1,094,387,000 (33.1%)
level percentage of payroll	200,611,000 (21.5%)	185,167,000 (20.3%)	98,449,000 (28.3%)	304,399,000 (27.3%)	788,626,000 (23.8%)

PERCENTAGES SHOWN AFTER DOLLAR COST REPRESENT COST AS A PERCENTAGE OF PAYROLL.





SECTION 1.2

CONTRIBUTION PROJECTIONS

This section contains a twenty-year projection of pay-as-you-go costs and funding costs starting in the fiscal 1980-81 year.

The payroll has been projected by the assumed inflation rate (see Section 2.3). The payroll shown in this projection represents the average, or mid-point, payroll for the applicable fiscal year. Thus the payroll for the 1980-81 fiscal year exceeds the January 1, 1979 payroll by two years of inflation increases.

The pay-as-you-go contribution represents the employer's portion of the retirement allowances projected to be payable to retired employees and beneficiaries in each fiscal year. It does not include the annuity portion, which is paid from the Annuity Reserve Fund.

The funding contribution assumes a five-year phase-in to full actuarial funding, by contributing the normal cost and a fractional part of the amortization cost as follows:

<u>Year</u>	<u>State, Teachers</u>	<u>Locals</u>
1	1/5	1/15
2	2/5	3/15
3	3/5	6/15
4	4/5	10/15
5 and later	Full	Full

Where a system has made contributions under Chapter 559 of the Acts of 1977 as shown in Appendix B of Section 3, the funding contribution assumes that the system is partially through the phase-in period. The State and Teachers systems are assumed to be entering the fourth year of the phase-in period, since funding appropriations were made in three years prior to the 1980-81 fiscal year. No other funding contributions have been assumed to have been made between January 1, 1979 and July 1, 1980 except those summarized in Appendix B.



For some systems, the pay-as-you-go contribution exceeded the calculated funding contribution in the early years of the phase-in period, in which case the funding contribution was increased to the level of the pay-as-you-go contribution for such years.

Percentage of payroll amounts represent the percentage of the cost to the projected payroll for the applicable fiscal year.

The additional contribution represents the amount, if any, which must be made in a particular fiscal year in excess of the pay-as-you-go contribution in order to bring the total contribution up to the level of the funding cost for the year.

Because the assumptions used to project costs are chosen for long-term expectations, the dollar amounts of required contributions may vary somewhat from those shown in the projections in the early years. The more reliable statistic to consider in the short-term would be the percentage of payroll contribution rates, recognizing that significant cutbacks in personnel as a result of Proposition 2½ or other budget constraints could cause the percentage of payroll contribution rates to increase.



## SECTION 1.2

## CONTRIBUTION PROJECTIONS (cont'd)

Projection for Teachers Board  
(Dollar amounts in thousands)

<u>Fiscal Year</u>	<u>Projected Payroll</u>	<u>Pay-as-you-go Contribution</u>	<u>% of Payroll</u>	<u>Funding Contribution</u>	<u>% of Payroll</u>	<u>Additional Contributor</u>
1980-81	\$ 996,506	\$132,402	13.3	\$185,350	18.6	\$52,948
1981-82	1,041,349	143,707	13.8	216,601	20.8	72,894
1982-83	1,088,209	155,652	14.3	226,347	20.8	70,695
1983-84	1,137,179	168,161	14.8	236,533	20.8	68,372
1984-85	1,188,352	181,109	15.2	247,177	20.8	66,068
1985-86	1,241,828	196,578	15.8	258,300	20.8	61,722
1986-87	1,297,710	213,146	16.4	269,923	20.8	56,777
1987-88	1,356,107	230,829	17.0	282,070	20.8	51,241
1988-89	1,417,132	249,814	17.6	294,763	20.8	44,949
1989-90	1,480,902	272,697	18.4	308,028	20.8	35,331
1990-91	1,547,543	297,588	19.2	321,889	20.8	24,301
1991-92	1,617,183	324,546	20.1	336,374	20.8	11,828
1992-93	1,689,956	353,568	20.9	351,511	20.8	0
1993-94	1,766,004	387,821	22.0	367,329	20.8	0
1994-95	1,845,474	424,779	23.0	383,859	20.8	0
1995-96	1,928,520	464,731	24.1	401,132	20.8	0
1996-97	2,015,304	507,422	25.2	419,183	20.8	0
1997-98	2,105,992	556,878	26.4	438,046	20.8	0
1998-99	2,200,762	610,138	27.7	457,758	20.8	0
1999-00	2,299,796	667,397	29.0	478,358	20.8	0



## SECTION 1.2

## CONTRIBUTION PROJECTIONS (cont'd)

Projection for State Employees Board  
(Dollar amounts in thousands)

<u>Fiscal Year</u>	<u>Projected Payroll</u>	<u>Pay-as-you-go Contribution</u>	<u>% of Payroll</u>	<u>Funding Contribution</u>	<u>% of Payroll</u>	<u>Additional Contribution</u>
1980-81	\$1,016,592	\$130,926	12.9	\$204,335	20.1	\$73,409
1981-82	1,062,339	145,670	13.7	232,652	21.9	86,982
1982-83	1,110,144	160,923	14.5	243,121	21.9	82,198
1983-84	1,160,101	176,476	15.2	254,062	21.9	77,586
1984-85	1,212,305	192,497	15.9	265,495	21.9	72,998
1985-86	1,266,859	211,341	16.7	277,442	21.9	66,101
1986-87	1,323,868	230,933	17.4	289,927	21.9	58,994
1987-88	1,383,442	251,008	18.1	302,974	21.9	51,966
1988-89	1,445,697	271,961	18.8	316,607	21.9	44,646
1989-90	1,510,753	296,647	19.6	330,855	21.9	34,208
1990-91	1,578,737	322,786	20.4	345,743	21.9	22,957
1991-92	1,649,780	349,870	21.2	361,302	21.9	11,432
1992-93	1,724,020	377,509	21.9	377,560	21.9	51
1993-94	1,801,601	411,984	22.9	394,551	21.9	0
1994-95	1,882,673	448,749	23.8	412,305	21.9	0
1995-96	1,967,393	484,761	24.6	430,859	21.9	0
1996-97	2,055,926	522,391	25.4	450,248	21.9	0
1997-98	2,148,443	565,740	26.3	470,509	21.9	0
1998-99	2,245,123	612,772	27.3	491,682	21.9	0
1999-00	2,346,153	663,307	28.3	513,808	21.9	0





## SECTION 1.2

## CONTRIBUTION PROJECTIONS (cont'd)

Projection for Boston Board  
(Dollar amounts in thousands)

<u>Fiscal Year</u>	<u>Projected Payroll</u>	<u>Pay-as-you-go Contribution</u>	<u>% of Payroll</u>	<u>Funding Contribution</u>	<u>% of Payroll</u>	<u>Additional Contributor</u>
1980-81	\$380,351	\$ 86,691	22.8	\$ 53,629	14.1	\$ 0
1981-82	397,467	94,638	23.8	65,185	16.4	0
1982-83	415,353	102,725	24.7	83,071	20.0	0
1983-84	434,043	110,474	25.5	107,209	24.7	0
1984-85	453,575	117,877	26.0	138,794	30.6	20,917
1985-86	473,986	126,587	26.7	145,040	30.6	18,453
1986-87	495,316	135,353	27.3	151,567	30.6	16,214
1987-88	517,605	143,917	27.8	158,387	30.6	14,470
1988-89	540,897	152,327	28.2	165,515	30.6	13,188
1989-90	565,237	162,218	28.7	172,963	30.6	10,745
1990-91	590,673	172,280	29.2	180,746	30.6	8,466
1991-92	617,253	182,281	29.5	188,879	30.6	6,598
1992-93	645,030	192,133	29.8	197,379	30.6	5,246
1993-94	674,056	203,310	30.2	206,261	30.6	2,951
1994-95	704,389	214,243	30.4	215,543	30.6	1,300
1995-96	736,086	225,050	30.6	225,242	30.6	192
1996-97	769,210	235,945	30.7	235,378	30.6	0
1997-98	803,825	248,657	30.9	245,970	30.6	0
1998-99	839,997	261,169	31.1	257,039	30.6	0
1999-00	877,797	273,391	31.1	268,606	30.6	0



## SECTION 1.2

## CONTRIBUTION PROJECTIONS (cont'd)

Projection for Other Local Boards  
(Dollar amounts in thousands)

<u>Fiscal Year</u>	<u>Projected Payroll</u>	<u>Pay-as-you-go Contribution</u>	<u>% of Payroll</u>	<u>Funding Contribution</u>	<u>% of Payroll</u>	<u>Additional Contribution</u>
1980-81	\$1,216,697	\$194,647	16.0	\$207,570	17.1	\$ 12,923
1981-82	1,271,446	218,756	17.2	240,783	19.0	22,027
1982-83	1,328,661	243,815	18.4	287,756	21.7	43,941
1983-84	1,388,451	269,492	19.4	345,719	24.9	76,227
1984-85	1,450,933	295,772	20.4	420,557	29.0	124,785
1985-86	1,516,226	325,259	21.5	439,482	29.0	114,223
1986-87	1,584,456	355,652	22.5	459,259	29.0	103,607
1987-88	1,655,756	386,859	23.4	479,926	29.0	93,067
1988-89	1,730,266	418,761	24.2	501,523	29.0	82,762
1989-90	1,808,128	455,242	25.2	524,092	29.0	68,850
1990-91	1,889,493	493,416	26.1	547,676	29.0	54,260
1991-92	1,974,522	532,439	27.0	572,320	29.0	39,881
1992-93	2,063,374	572,196	27.7	598,075	29.0	25,879
1993-94	2,156,227	616,369	28.6	624,989	29.0	8,620
1994-95	2,253,257	660,885	29.3	653,113	29.0	0
1995-96	2,354,655	705,641	30.0	682,504	29.0	0
1996-97	2,460,615	751,597	30.5	713,216	29.0	0
1997-98	2,571,341	802,953	31.2	745,311	29.0	0
1998-99	2,687,053	854,617	31.8	778,850	29.0	0
1999-00	2,807,969	906,559	32.3	813,898	29.0	0



## SECTION 1.2

## CONTRIBUTION PROJECTIONS (cont'd)

Projection for All Boards Combined  
(Dollar amounts in thousands)

<u>Fiscal Year</u>	<u>Projected Payroll</u>	<u>Pay-as-you-go Contribution</u>	<u>% of Payroll</u>	<u>Funding Contribution</u>	<u>% of Payroll</u>	<u>Additional Contribution</u>
1980-81	\$3,610,146	\$ 544,666	15.1	\$ 650,884	18.0	\$106,218
1981-82	3,772,601	602,771	16.0	755,221	20.0	152,450
1982-83	3,942,367	663,115	16.8	840,297	21.3	177,182
1983-84	4,119,774	724,603	17.6	943,523	22.9	218,920
1984-85	4,305,165	787,255	18.3	1,072,023	24.9	284,768
1985-86	4,498,899	859,765	19.1	1,120,264	24.9	260,499
1986-87	4,701,350	935,084	19.9	1,170,676	24.9	235,592
1987-88	4,912,910	1,012,613	20.6	1,223,357	24.9	210,744
1988-89	5,133,992	1,092,863	21.3	1,278,408	24.9	185,545
1989-90	5,365,020	1,186,804	22.1	1,335,938	24.9	149,134
1990-91	5,606,446	1,286,070	22.9	1,396,054	24.9	109,984
1991-92	5,858,738	1,389,136	23.7	1,458,875	24.9	69,739
1992-93	6,122,380	1,495,406	24.4	1,524,525	24.9	29,119
1993-94	6,397,888	1,619,484	25.3	1,593,130	24.9	0
1994-95	6,685,793	1,748,656	26.2	1,664,820	24.9	0
1995-96	6,986,654	1,880,183	26.9	1,739,737	24.9	0
1996-97	7,301,055	2,017,355	27.6	1,818,025	24.9	0
1997-98	7,629,601	2,174,228	28.5	1,899,836	24.9	0
1998-99	7,972,935	2,338,696	29.3	1,985,329	24.9	0
1999-00	8,331,715	2,510,654	30.1	2,074,670	24.9	0



### SECTION 1.3

#### ASSETS AND ACTUARIAL LIABILITIES, JANUARY 1, 1979

This section summarizes the assets and actuarial liabilities of the systems included in the valuation.

The actuarial liabilities are computed in accordance with the procedures described in Section 2.3. The unfunded actuarial liability represents the amount as of the valuation date which must be funded by future amortization payments. It does not represent the unfunded value of benefits earned by members for service prior to the valuation date; these amounts are shown in Section 1.4 of this report. The chief significance of the unfunded actuarial liabilities as they relate to the financial condition of the employer is the ability of that employer to support the cost of amortizing them over a reasonable number of years.

Assets include amounts appropriated under Chapter 559 of the Acts of 1977 as shown in Appendix B in Section 3.





SECTION 1.3

ASSETS AND ACTUARIAL LIABILITIES (cont'd)

	State	Teachers	Boston*	Other Local Boards	Total
Actuarial liability - active members	\$1,444,526,000	\$1,886,919,000	\$ 902,480,000	\$2,420,199,000	\$ 6,654,124,000
Actuarial liability - retired members	<u>1,292,207,000</u>	<u>1,259,347,000</u>	<u>760,165,000</u>	<u>1,714,941,000</u>	<u>5,026,660,000</u>
Total actuarial liability	\$2,736,733,000	\$3,146,266,000	\$1,662,645,000	\$4,135,140,000	\$11,680,784,000
Assets	<u>682,163,000</u>	<u>807,785,000</u>	<u>278,232,000</u>	<u>786,094,000</u>	<u>2,554,274,000</u>
Unfunded actuarial liability	\$2,054,570,000	\$2,338,481,000	\$1,384,413,000	\$3,349,046,000	\$ 9,126,510,000

\* Includes Boston teachers, for whom the Commonwealth has assumed the obligation for retirement payments in the past.



## SECTION 1.4

### FINANCIAL DISCLOSURE

This section contains certain financial disclosure information required by the Statement of Financial Accounting Standards No. 35, published in March, 1980 by the Financial Accounting Standards Board. The first paragraph of the Summary accompanying the Statement says in part:

"This Statement establishes standards of financial accounting and reporting for the annual financial statements of a defined benefit pension plan (plan). It applies both to plans in the private sector and to plans of state and local governmental units..."

The information shown in this section follows the procedures set forth in Statement No. 35 except in the reporting of the plan's assets, which are to be shown at fair market value. In this instance, statutory values are shown since fair market values were not available from the Annual Reports to the Department of Insurance.

The actuarial value of accrued benefits represents the actuarial value, on the valuation date (January 1, 1979), of benefits earned by active and retired members based on their creditable service and earnings up to the valuation date. Statement No. 35 refers to those benefits as "accumulated plan benefits" and defines them as:

"...those future benefit payments that are attributable under the plan's provisions to employees' service rendered to the benefit information date. Their measure is primarily based on employees' history of pay and service and other appropriate factors as of that date. Future salary changes are not considered. Future years of service are considered only in determining employees' expected eligibility for particular types of benefits, for example, early retirement, death and disability benefits."

The statement continues,

"To measure their actuarial present value, assumptions are used to adjust those accumulated plan benefits to reflect the time value of money (through discounts for interest) and the probability of payment (by means of decrements such as for death, disability, withdrawal, or retirement) between the benefit information date and the expected date of payment. An assumption of an ongoing plan underlies those assumptions."



In addition to the actuarial value of total accrued benefits, this section summarizes the actuarial value of accrued vested benefits. Vested benefits are those benefits which do not depend upon the member remaining in service in order to be entitled to them. Member accumulated contributions for those members who have not yet attained a sufficient number of years of service to be vested are included in the actuarial value of vested accrued benefits.



## SECTION 1.4

## FINANCIAL DISCLOSURE (cont'd)

	State	Teachers	Boston	Other Local Boards	Total
Actuarial value of accrued vested benefits	\$2,324,920,000	\$2,488,384,000	\$1,416,045,000	\$3,356,412,000	\$9,585,761,000
Assets	<u>682,163,000</u>	<u>807,785,000</u>	<u>278,232,000</u>	<u>786,094,000</u>	<u>2,554,274,000</u>
Unfunded value of accrued vested benefits	\$1,642,757,000	\$1,680,599,000	\$1,137,813,000	\$2,570,318,000	\$7,031,487,000
Actuarial value of total accrued benefits	\$2,426,783,000	\$2,623,765,000	\$1,508,792,000	\$3,574,687,000	\$10,134,027,000
Assets	<u>682,163,000</u>	<u>807,785,000</u>	<u>278,232,000</u>	<u>786,094,000</u>	<u>2,554,274,000</u>
Unfunded value of total accrued benefits	\$1,744,620,000	\$1,815,980,000	\$1,230,560,000	\$2,788,593,000	\$7,579,753,000





## SECTION 1.5

### COMMENTARY

The effective date of this valuation is January 1, 1979. The effective date of the preceding valuation was January 1, 1976. It is not possible to analyze with precision the reasons for the changes in the valuation results from 1976 to 1979, since the nature and extent of the membership data was so much more complete and up-to-date in this valuation compared to the valuation in 1976.

In 1976, active membership data for the state system was projected from January 1, 1973 data and only included 42,707 members, with age and service information missing for 19,151 and sex code missing for all. For the teachers' system, active membership data was projected from January 1, 1971 data and included only 58,916 members. For the local systems, data on retired members was projected from January 1, 1972 data. By comparison, Section 2.2 indicates that very little data for the 1979 valuation had to be projected from earlier years' information, and by and large was 90% to 100% accurate.

The Commissioners, the Commission staff and many state and local officials are to be congratulated on their efforts to obtain the detailed information necessary to perform actuarial valuations for the 100 systems included in this report. The reliability of the results of any actuarial valuation or study cannot be any greater than the reliability of the data used for such study. For this reason, the maintenance of a complete and up-to-date data bank on active and retired members of the various retirement systems is the first and most important step in providing the necessary information to public officials and the general public on the status of those systems and the effect of any proposed changes to them.

Certain actuarial assumptions were different in 1979 from those used in the 1976 valuation. Chief among these were the investment return assumption, which was 7% in 1979 compared to 7½% in 1976, and the retirement age assumptions, which were changed from various assumed average retirement ages to tables of retirement probabilities, developed from a study of recent experience of the systems. These changes may have caused the results of the 1979 valuation to be slightly more conservative than the 1976 valuation.

Recognizing the difference in actuarial assumptions and the reliability of the 1979 data compared to 1976, the following comparisons are made.



Active payroll increased by 15% from 1976 to 1979. There was, however, considerable variation in this statistic among individual systems. Some local systems saw increases of 30% to 40% in active payroll over the period, while a few showed a slight decrease. Payroll for state system members increased by 19%; payroll for teachers increased by only 3%.

The total employer normal cost rose by 29% over the three-year period. This was caused by the combination of payroll increase and an increase in the normal cost rate from 11.5% to 12.9% of payroll. Total level funding cost (level percentage of payroll) rose from 22.4% of payroll to 23.8%. These changes were undoubtedly caused partially by the difference in data accuracy and changes in actuarial assumptions, but also reflect, in the latter instance especially, lack of adequate funding during the period, which would be necessary to maintain a level funding cost.

The member contribution rate rose from 5.2% to 5.4% of payroll, reflecting the greater number of members contributing at the 7% rate.

The unfunded actuarial liability increased by 19% from 1976 to 1979, in dollar terms an increase of \$1.5 billion. Once again, increases in payroll combined with the lack of adequate funding contributed heavily to this change. In addition, it appears that the more complete data in 1979 for retired members of local systems may have been a significant factor in this increase, since the actuarial liability for all retired members of all systems increased by \$1.1 billion, or 29%, and the increase in this statistic for many local systems was 50% or more.

Previously, the unfunded actuarial liability was the only measure given of the governmental units' responsibility for operation of the systems in the past. With this valuation, financial disclosure information was provided in accordance with the latest accounting standards published by the Financial Accounting Standards Board, which showed an unfunded actuarial value of total accrued benefits of \$7.58 billion and an unfunded actuarial value of vested accrued benefits of \$7.03 billion. The only statistic available for financial disclosure purposes in the 1976 report, the unfunded actuarial liability calculated for funding purposes, was higher than either of these amounts at \$7.64 billion. (The comparable figure in 1979 was \$9.13 billion.) This underscores the desirability of calculating and having available the FASB financial disclosure information for bond statements and the like, as well as for a continuing measure of the progress (or lack of progress) in funding for members' accrued benefits.



The twenty-year projections of funding and pay-as-you-go costs show very clearly the kind of cost stability that can be attained under a program of advance funding. It is encouraging to observe the number of systems which have embarked upon such a program as a result of the 1977 legislation, including the state and teachers' systems. It is also possible for towns which participate in a county retirement system to utilize this cost-stabilizing technique, as some are now doing and others are actively investigating.

The valuation results as presented in this report do not reflect the effect of the 1978 court reform legislation which resulted in the transfer of county court personnel to the state system. However, the combined results of all systems would not be materially affected had data been available to reflect such transfers.

Finally, the comparisons between the 1976 and 1979 liabilities and costs, as well as the projections of dollar funding and pay-as-you-go costs for the next twenty years, might be analyzed in terms of real dollar values at the various points in time. From the first quarter of 1976 to the first quarter of 1979, the Consumer Price Index increased by 24%. Similarly, inflation is assumed to continue for purposes of the cost projections at  $4\frac{1}{2}\%$  annually, giving the dollar cost in the twentieth year a real value of only 43 cents compared to the dollar cost in the first year.



## SECTION 2

### BASIS OF VALUATION

In this section, the basis of the actuarial valuations is described. This information -- the benefit and eligibility provisions of Chapter 32 of the General Laws and the census of participating members -- is the foundation of the valuations, since these are the present facts upon which benefit payments will depend.

The valuations are based on the premise that the systems will continue in existence, so that future events must also be considered. These future events are assumed to occur in accordance with the actuarial assumptions and concern such events as the earnings on invested assets, the number of members who will remain to retirement, their ages at retirement and expected benefits.

The actuarial assumptions and the actuarial cost method which have been adopted by the Commission to provide information on the proper funding levels to fund the systems in a reasonable manner and on future cash requirements for the systems, are described in this section.





SECTION 2.1

SUMMARY OF PRINCIPAL BENEFIT AND  
ELIGIBILITY PROVISIONS, JANUARY 1, 1979

---

CATEGORY OF MEMBER	Group 1: Most general employees in state and local government.  Group 2: Certain specified hazardous duty positions.  Group 3: State police, certain other positions in Department of Public Safety.  Group 4: Police and firefighters in local systems.
MEMBER CONTRIBUTIONS	Hired prior to January 1, 1975: 5% of salary  Hired on or after January 1, 1975: 7% of salary
CREDITABLE SERVICE	All membership service, plus military service up to four years and certain other purchased service.
RETIREMENT	
Eligibility	Age 55 or 20 years of service.  Group 3: Later of age 50 or 20 years of service.
Benefit	Group 1: 2.5% at retirement age 65 or over  Group 2: 2.5% at retirement age 60 or over  Group 4: 2.5% at retirement age 55 or over

---



---

RETIREMENT (cont'd)

Benefit (cont'd)

Percentages on the preceding page are reduced by 0.1% for each year younger at retirement than age shown on the preceding page, and multiplied by final three-year average annual rate of regular compensation.

Group 3: 50% of final year's rate of regular compensation, plus an additional 1% for each year of service in excess of 20.

Veterans (all groups) receive an additional \$15.00 annually for each year of service to a maximum of \$300.00.

---

FORM OF  
BENEFIT

Normal (Option A) -- Life annuity

Option B -- Life annuity with death benefit equal to excess of member contributions plus credited interest to retirement over annuity benefits paid to member.

Option C -- Life annuity with 66-2/3% of benefit continued after death of member to designated joint annuitant.

---

VESTING

Requirement

Ten years of service.

Benefit

If over age 55, accrued retirement benefit payable immediately or deferred to a maximum of age 70.

If under age 55, accrued retirement benefit payable at age 55 or withdrawal of member contributions plus credited interest.



---

DISABILITY --  
OCCUPATIONAL

Requirement

No service or age requirement.

Benefit

72% of final rate of regular compensation plus \$312.00 per year for each child plus annuity based on accumulated member contributions with credited interest.

Maximum of 100% of final salary rate.

---

DISABILITY --  
NON-OCCUPATIONAL

Requirement

Veterans -- 10 years service  
Non-veterans -- 15 years service

Benefit

Veterans -- 50% of final rate of regular compensation plus additional 1% for each year of service over ten years to a maximum of 15 additional years plus annuity based on accumulated member contributions plus credited interest.

Non-veterans -- accrued retirement benefit as if member were age 55.

---

SURVIVOR BENEFITS --  
(Death in Active  
Service)  
OCCUPATIONAL

Requirement

No age or service requirement.

Benefit

Same as occupational disability benefit.

---



---

SURVIVOR BENEFITS  
(Death in Active  
Service)  
NON-OCCUPATIONAL

Requirement

Two years service, married for one year.

Benefit

Accrued retirement benefit as if Option C had been elected with a minimum of \$140.00 per month to widow plus \$80.00 if one child plus \$60.00 each additional child or refund of member contributions with credited interest.

---

COST-OF-LIVING  
INCREASES

If the Consumer Price Index for the year increases by at least 3% over the Consumer Price Index last used to determine a cost-of-living increase to pensioners, the general court determines a cost-of-living increase to be applied to the first \$6,000\* of annual pension effective on the following July 1.

---

\* Amended to \$7,000 effective July 1, 1981.





## SECTION 2.2

### MEMBERSHIP DATA

The actuarial valuation and the calculation of liabilities and funding costs are based on the membership data furnished by the Commission. The data was validated for internal consistency and reconciled with the Annual Reports prepared each year by each board for the Department of Insurance. Many error conditions or inconsistencies in data were brought to the attention of the Commission and resolved prior to the preparation of the actuarial valuations. Where it was not possible to obtain corrected data within the time allowed, reasonable adjustments or assumptions were made for the valuation.

For the majority of the systems, the data was eventually brought to the level of 90% to 100% correct, complete and consistent with the Annual Reports prepared for the Department of Insurance. In these cases, the individual reports indicate that the data was 90% to 100% complete, with no other qualification on the reliability of the valuation results. For certain systems, the data was less than 90% correct and complete, and adjustments were made to the final valuation results to make those results representative of 100% of the liabilities and costs of the system. For nine local systems, no data was furnished in computer readable form before the final cutoff date established by the Commission. For these systems, a projection was made using the data furnished for the January 1, 1976 actuarial valuation for active members and the December 31, 1978 Annuity Reserve data for retired members.

The results of the valuation for the systems which did not submit at least 90% complete and correct data were qualified because of the missing data, necessitating the use of certain procedures to bring the results to a basis representative of 100% of the liabilities and costs of the systems. Details on these qualifications may be found in the individual actuarial valuation reports for those systems.

#### State Employees

The data for active members contained 88,623 computer tape records, of which 9,302 were assumed to be currently inactive based on earnings shown for 1978, and the remaining 79,321 were assumed to be currently active.



Of the 79,321 active member records, 7% were missing a sex code, 10% were missing age information and 13% were missing service information. Assumptions were made to fill in the missing information and are described in detail in the individual actuarial report for the system.

No assumptions or adjustments were required to be made to the retired member data, which included 23,093 retired members.

#### Teachers

Data submitted for the Teachers Retirement Board was found to be between 90% and 100% complete and accurate, requiring no qualification or adjustment. Data was submitted on 76,234 active members and 16,631 retired members.

#### City of Boston

Data submitted by the City of Boston included 18,250 active members, compared to 23,260 active members shown in the Annual Report prepared for the Department of Insurance. Data was submitted on 3,309 inactive members compared to 5,984 shown in the Annual Report. Assumptions were made as to the characteristics of the missing data, adjustments were made to bring the valuation results to a basis representative of 100% of the liabilities and costs of the system, the details of which are described in the individual actuarial valuation report for the system.

Data submitted with respect to 10,859 retired members was complete except that no option codes were included. An assumption was made to compensate, which is described in the actuarial valuation report for the system.

#### Other Local Boards

(Cities, Counties, Towns and Authorities)

Actuarial valuations were done for a total of 97 local systems. Of this number, 84 submitted data which was 90% to 100% complete, representing 81,730 active members and 27,504 retired members.

Four systems submitted data which was less than 90% complete, representing 6,350 active members and 2,334 retired members.

A total of nine systems did not submit data by the cutoff date, representing 14,237 active members and 4,755 retired members.

A summary of the participant data used for the valuation is shown on the following page.



Summary of Participant Data

<u>Board</u>	<u>Group 1 and 2</u>	<u>Group 3</u>	<u>Group 4</u>	<u>Total Active</u>	<u>Inactive*</u>	<u>Retired**</u>
State	78,269	1,052	0	79,321	9,302	23,093
Teachers	76,234	0	0	76,234	8,552	16,631
Boston	14,763	0	3,487	18,250	3,309	10,859
Other Local Boards	<u>79,482</u>	<u>0</u>	<u>22,835</u>	<u>102,317</u>	<u>6,842</u>	<u>34,143</u>
TOTALS	248,748	1,052	26,322	276,122	28,005	84,726

\* Inactive members are not currently in service, but have left their contributions in the system.

\*\* Includes beneficiaries receiving retirement payments.



## SECTION 2.3 - ACTUARIAL BASIS

### GENERAL

A retirement system is somewhat unique in the field of employee fringe benefits in that benefits are earned, and thus a labor cost incurred, while the employee is working, but there is no cash expense until after the employee retires. A young employee earning pension credits by his employment this year may not start to collect those benefits for another 30, 35 or 40 years. For this reason, it has been deemed advisable, and in fact made mandatory in the private sector by the Employee Retirement Income Security Act of 1974 (ERISA), to fund in advance for future pension obligations.

A funding program is simply a device by which the labor costs incurred while an employee is working and earning pension credits are assigned to and funded during the working lifetime of the employee, rather than being deferred to the time when the employee has retired and is collecting benefits.

The ultimate obligation for pension payments requires long-range forecasting by the actuary of certain events, such as:

- mortality rates among members
- turnover rates among members
- ages at which members will retire and collect benefits
- investment return on contributions to the pension fund
- rate at which members' salaries will increase
- rate at which inflation will require post-retirement adjustments to pensions.

These are called actuarial assumptions, and are used in projecting the long-term cost of the system. Of that cost, members' contributions are usually fixed as a specified percentage of their salaries, with the employer paying the balance of the cost. Therefore, it is essentially the employer's cost that is being projected using the actuarial assumptions.

These actuarial assumptions will predict the time when certain benefits will be paid and the amount of these payments. This will enable the actuary to place a specific value on all of those benefits at a particular date, usually a valuation date, by discounting with interest from the dates of expected payment to the valuation date.





The actuarial cost method allocates the total value of all benefits to time periods, usually over the working lifetime of the member, for expensing and funding for the benefits. Most actuarial cost methods assign a portion of the total value of benefits to years of members' employment before the valuation date and the balance to years of employment after the valuation date. Each individual year's portion of the total value assigned to years after the valuation date is referred to as the normal cost of the retirement program. This is what the full cost of the system would be if it had always been funded according to that cost method from the time the first member was hired, the plan had never been amended to increase benefits, and all actuarial assumptions had been exactly realized.

The accumulated value, on the valuation date, of the total value of benefits assigned to periods prior to the valuation date (prior years' normal costs) is referred to as the actuarial accrued liability or actuarial liability. To the extent that the actuarial liability exceeds the assets of the system, there exists an unfunded actuarial liability. The unfunded actuarial liability is usually amortized over a specified number of years, either as a level dollar amount or as a level percentage of future payroll.

While an unfunded actuarial liability exists, the cost of funding the system is composed of two components: the normal cost and an amortization cost for the unfunded actuarial liability. After the fixed period of amortization, the total annual cost of funding consists of the normal cost alone.

When the experience varies from that anticipated by the actuarial assumptions, actuarial gains or losses occur, the effect of which may be spread into future normal costs or future amortization costs, depending on the actuarial cost method used.



## SECTION 2.3 - ACTUARIAL BASIS (cont'd)

### ACTUARIAL COST METHOD

The actuarial cost method used to determine liabilities and costs as of January 1, 1979 and to project future funding requirements is known as the Entry Age Normal Cost Method. Under this method, the annual normal cost of the system is determined as the aggregate level percentage of payroll necessary to fund all benefits expected to be paid if such percentage of each member's pay was and will be contributed from entry into the system until retirement, death or termination of employment. The actuarial liability on the valuation date is calculated as the amount which would be on hand if all prior normal costs had been fully funded. The unfunded actuarial liability on January 1, 1979 is the actuarial liability less the assets.

The system is expected to contribute the normal cost each year and to amortize the unfunded actuarial liability over a period of forty years on the basis of a level percentage of payroll.



SECTION 2.3 - ACTUARIAL BASIS (cont'd)

ACTUARIAL ASSUMPTIONS

Actuarial assumptions were recommended to the Commission by the actuary. After some modifications as a result of discussion between the actuary and the Commission, the following actuarial assumptions were adopted for use in this valuation:

Mortality was assumed to be in accordance with the Group Annuity Table for 1971, with ages set back six years for females. This table is the most recently developed mortality table using a large body of data collected on a national scale.

Investment return on current assets and future contributions was assumed to be at the rate of 7% per year, compounded annually. This return includes interest, dividends and realized and unrealized gains.

Salary increases were assumed to occur at the rate of 5½% per year.

Cost-of-living increases were assumed to occur at the rate of 4½% per year.

Rates of disablement were assumed to occur in accordance with Social Security experience published in 1972, as illustrated by the following sample rates:

Age	Percentage Becoming Disabled During Year	
	Group 1, 2 or 3	Group 4
20	0.06%	0.12%
30	0.11	0.22
40	0.22	0.44
50	0.61	1.21

For Groups 1 and 2, it was assumed that 50% of the disabilities were occupational, and for Groups 3 and 4, 90% of the disabilities were occupational.



Rates of turnover (terminations of employment before becoming eligible for retirement) for Groups 1 and 2 were in accordance with tables published in The Actuary's Pension Handbook; Crocker, Sarason and Straight, 1955, as illustrated by the following sample rates:

<u>Age</u>	<u>Percentage Terminating During Year</u>		
	<u>State, Teachers</u> <u>Groups 1 and 2</u>	<u>Boston</u> <u>Groups 1 and 2</u>	<u>Locals</u> <u>Groups 1 and 2</u>
20	5.44%	6.58%	7.94%
30	3.70	4.83	7.22
40	1.13	3.84	5.15
50	0.00	1.52	2.56
Table	T-1	T-3	T-5

No turnover was assumed for Groups 3 and 4.

Retirements were assumed to occur in accordance with the following distribution by age at retirement, taken from an analysis of actual retirement practices over recent years:

<u>Age</u>	<u>Percentage of Total Retirements at Ages</u>		
	<u>State, Teachers</u> <u>Groups 1 and 2</u>	<u>Boston, Locals</u> <u>Groups 1 and 2</u>	<u>Group 4</u>
50	0.00%	0.00%	32.01%
51	0.00	0.00	4.88
52	0.00	0.00	3.74
53	0.00	0.00	4.77
54	0.00	0.00	4.20
55	12.55	8.02	7.83
56	2.81	1.51	3.86
57	2.62	2.07	3.52
58	2.74	3.81	4.20
59	2.76	2.64	3.52
60	6.00	4.88	6.58
61	4.88	5.38	2.84
62	9.92	10.48	3.52
63	5.97	6.11	1.82
64	5.16	6.61	2.38
65	15.91	16.42	10.33
66	6.35	7.51	0.00
67	4.82	4.48	0.00
68	3.79	4.60	0.00
69	3.48	4.49	0.00
70	<u>10.24</u>	<u>10.99</u>	<u>0.00</u>
	100.00%	100.00%	100.00%

Group 3 employees were expected to retire at the later of age 50 or 20 years of service.





Assets are valued at statutory values as shown in the Annual Reports to the Department on Insurance. Assets include appropriations made under Chapter 559 of the Acts of 1977 as shown in Appendix B.

The greatest degree of attention is usually given to the so-called "economic" assumptions. The economic assumptions are those which will be affected by a change in the rate of inflation, such as investment return, salary increases and cost-of-living increases. Even more important than the absolute rates assumed is the consistency among the three assumptions; i.e., that all assume the same underlying rate of inflation.

When the underlying rate of inflation is increased or decreased, the change in liabilities and costs due to higher or lower projected benefits from the salary increase and cost-of-living assumption changes is offset to a major degree by the change in the investment earnings assumption.

In this case, a  $4\frac{1}{2}\%$  annual rate of inflation is assumed, and cost-of-living increases to retired members were assumed to be at that rate. Salary increases were assumed at the inflation rate plus an additional 1% for merit and productivity increases. Investment return was assumed at the inflation rate plus a  $2\frac{1}{2}\%$  "real rate of return".

These assumptions are used to make extremely long-term projections of future benefit liabilities. For this reason, the assumptions may not appear to be consistent with recent experience and the short-term outlook for inflation, salary increases and available interest rates. They are, however, considered appropriate for the longer term.



## SECTION 3

## APPENDIX A - 100 CONTRIBUTORY RETIREMENT SYSTEMS

COUNTIES

<u>Board Number</u>	<u>Name</u>						
101	Barnstable	015	Chicopee	043	Medford	072	Swampscott
102	Berkshire	016	Clinton	044	Melrose	073	Taunton
103	Bristol	017	Concord	045	Methuen	074	Wakefield
104	Dukes	018	Danvers	046	Milford	075	Waltham
105	Essex	019	Dedham	047	Milton	076	Watertown
106	Franklin	020	Easthampton	048	Montague	077	Webster
107	Hampden	021	Everett	049	Natick	078	Wellesley
108	Hampshire	022	Fairhaven	050	Needham	079	Westfield
109	Middlesex	023	Fall River	051	New Bedford	080	West Springfield
110	Norfolk	024	Falmouth	052	Newburyport	081	Weymouth
111	Plymouth	025	Fitchburg	053	Newton	082	Winchester
112	Worcester	026	Framingham	055	Northampton	083	Winthrop
		027	Gardner	056	North Attleborough	084	Woburn
		028	Gloucester			085	Worcester

CITIES & TOWNS

001	Adams	029	Greenfield	057	Northbridge		
002	Amesbury	030	Haverhill	058	Norwood		<u>Other</u>
003	Andover	031	Hingham	059	Peabody	201	State Employees
004	Arlington	032	Holyoke	060	Pittsfield	301	Teachers
005	Athol	033	Hull	061	Plymouth	401	Mass. Turnpike Authority
006	Attleboro	034	Lawrence	062	Quincy	402	Mass. Housing Finance
007	Belmont	035	Leominster	063	Reading		
008	Beverly	036	Lexington	064	Revere		
009	Boston	037	Lowell	065	Salem		
010	Braintree	038	Lynn	066	Saugus		
011	Brockton	039	Malden	067	Shrewsbury		
012	Brookline	040	Marblehead	068	Somerville		
013	Cambridge	041	Marlborough	069	Southbridge		
014	Chelsea	042	Maynard	070	Springfield		
				071	Stoneham		



## SECTION 3

APPENDIX B - CONTRIBUTORY RETIREMENT SYSTEMS WITH  
CONTRIBUTIONS UNDER CHAPTER 559 OF THE ACTS OF 1977

<u>Board Number</u>	<u>Name</u>	<u>Contributions</u>		
		<u>1979</u>	<u>1980</u>	<u>Total</u>
004	Arlington	\$250,000	\$283,000	\$ 533,000
010	Braintree	397,880	354,000	751,880
012	Brookline	0	300,000	300,000
017	Concord	50,000	50,000	100,000
019	Dedham	25,000	180,000	205,000
036	Lexington	100,000	200,000	300,000
042	Maynard	25,000	18,000	43,000
047	Milton	40,000	80,000	120,000
050	Needham	85,000	175,000	260,000
076	Watertown	0	400,000	400,000
078	Wellesley	255,000	341,345	596,345
201	State Employees			61,896,725
301	Teachers			61,115,489

