

City of Worcester Retirement System

*Actuarial Valuation and Review
as of January 1, 2008*

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The Segal Company
116 Huntington Ave., 8th Floor Boston, MA 02116
T 617.424.7300 F 617.424.7390 www.segalco.com

June 10, 2008

*City of Worcester Retirement System
City Hall, Room 103, 455 Main Street
Worcester, MA 01608*

Dear Board Members:

We are pleased to submit this Actuarial Valuation and Review as of January 1, 2008. It summarizes the actuarial data used in the valuation, establishes the funding requirements for fiscal 2009 and later years and analyzes the preceding year's experience.

The census information and financial information on which our calculations were based was prepared by the staff of the Worcester Retirement System. That assistance is gratefully acknowledged. The actuarial calculations were completed under my supervision.

This actuarial valuation has been completed in accordance with generally accepted actuarial principles and practices. To the best of our knowledge, the information supplied in this actuarial valuation is complete and accurate. Further, in our opinion, the assumptions as approved by the Board are reasonably related to the experience of and the expectations for the Plan.

We look forward to reviewing this report at your next meeting and to answering any questions.

Sincerely,

THE SEGAL COMPANY

By: 

*Kathleen A. Riley, FSA, MAAA, EA
Senior Vice President and Actuary*

SECTION 1

VALUATION SUMMARY

Purpose	i
Significant Issues in Valuation Year.....	i
Summary of Key Valuation Results.....	iii

SECTION 2

VALUATION RESULTS

A. Participant Data.....	1
B. Financial Information.....	4
C. Actuarial Experience.....	6
D. Recommended Contribution .	11
E. Information Required by the GASB.....	13

SECTION 3

SUPPLEMENTAL INFORMATION

EXHIBIT A Table of Plan Coverage.....	14
EXHIBIT B Participants in Active Service as of December 31, 2007	15
EXHIBIT C Summary Statement of Income and Expenses on an Actuarial Value Basis	16
EXHIBIT D Development of the Fund Through December 31, 2007	17
EXHIBIT E Development of Unfunded Actuarial Accrued Liability for Year Ended December 31, 2007	18
EXHIBIT F Table of Amortization Bases as of July 1, 2008.....	19
EXHIBIT G Funding Schedule	20
EXHIBIT H Department Allocations of 2002 and 2003 ERI Amortization Payments and Section 90 ACD Amortization Payments	21
EXHIBIT I Definitions of Pension Terms.....	22

SECTION 4

REPORTING INFORMATION

EXHIBIT I Summary of Actuarial Valuation Results	24
EXHIBIT II Supplementary Information Required by the GASB – Schedule of Employer Contributions.....	25
EXHIBIT III Supplementary Information Required by the GASB – Schedule of Funding Progress	26
EXHIBIT IV Supplementary Information Required by the GASB.....	27
EXHIBIT V Actuarial Assumptions and Actuarial Cost Method	28
EXHIBIT VI Summary of Plan Provisions	32

SECTION 1: Valuation Summary for the City of Worcester Retirement System

Purpose

This report has been prepared by The Segal Company to present a valuation of the City of Worcester Retirement System as of January 1, 2008. The valuation was performed to determine whether the assets and contributions are sufficient to provide the prescribed benefits. The contribution requirements presented in this report are based on:

- The benefit provisions of M.G.L. Chapter 32;
- The characteristics of covered active participants, inactive participants, and retired participants and beneficiaries as of December 31, 2007;
- The assets of the Plan as of December 31, 2007;
- Economic assumptions regarding future salary increases and investment earnings; and
- Other actuarial assumptions, regarding employee terminations, retirement, death, etc.

Significant Issues in Valuation Year

The following key findings were the result of this actuarial valuation:

- The actuarial valuation report as of January 1, 2008 is based on financial information as of that date. Changes in the value of assets subsequent to that date are not reflected.
- The market value rate of return for 2007 was 8.72% resulting in an investment gain on a market value basis of \$3,341,587.
- During the year ended December 31, 2007, there was an experience gain of \$1,900,536 due to the investment gain noted above, partially offset by greater than expected salary increases and fewer deaths than expected among retired members and beneficiaries.
- Salaries reported for 2007 were adjusted to reflect retroactive salary payments made in 2007 for firefighters and police officials.
- As requested by the Board, we have included an estimated liability of \$16.3 million to account for anticipated net 3(8)(c) reimbursements. The estimate was based on net 3(8)(c) reimbursements of \$1.9 million per year.

SECTION 1: Valuation Summary for the City of Worcester Retirement System

- The unfunded liability has increased from \$120.8 million as of January 1, 2007 to \$130.5 million as of January 1, 2008. This increase is due to the additional liability for the net 3(8)(c) reimbursements, partially offset by the experience gain and contributions made.
- Because the fiscal 2009 appropriation was set at the previously budgeted amount of \$24,947,158, the results of this valuation will first be reflected in the fiscal 2010 appropriation of \$26,099,353. The current funding schedule amortizes the 2002 ERI in level dollar amounts through fiscal 2018 (10 payments remaining), the 2003 ERI in level dollar amounts through fiscal 2012 (four payments remaining), the Section 90 ACD liability in level dollar amounts through fiscal 2014 (six payments remaining), and the remaining unfunded liability in increasing payments (4.0% per year) through fiscal 2019 (11 payments remaining). In the prior funding schedule, the remaining unfunded liability was amortized in increasing (3.5% per year) payments through fiscal 2018.
- The funded ratio has decreased from 85.58% as of January 1, 2007 to 85.33% as of January 1, 2008.

SECTION 1: Valuation Summary for the City of Worcester Retirement System

Summary of Key Valuation Results

	2008	2007
Contributions:		
Recommended for fiscal 2009 and 2008	\$24,947,158	\$24,166,318
Recommended for fiscal 2010 and 2009	\$26,099,353	\$24,947,158
Funding elements for plan year beginning January 1:		
Normal cost, including administrative expenses	\$22,574,842	\$22,122,545
Market value of assets	759,410,332	716,796,770
Actuarial value of assets	759,410,332	716,796,770
Actuarial accrued liability	889,924,310	837,608,233
Unfunded actuarial accrued liability	130,513,978	120,811,463
GASB 25/27:		
Annual required contributions	\$24,947,158	\$24,166,318
Actual contributions	--	24,166,318
Percentage contributed	--	100.00%
Funded ratio	85.33%	85.58%
Demographic data for plan year beginning January 1:		
Number of retired participants and beneficiaries	2,849	2,864
Number of inactive participants entitled to a return of their employee contributions	844	1,016
Number of inactive participants with a vested right to a deferred or immediate benefit	54	56
Number of active participants	3,299	3,397
Total payroll*	\$149,249,401	\$145,737,036
Average payroll*	45,241	42,902

* Calendar year 2007 payroll figures were reduced to reflect retroactive salary payments made in 2007 for firefighters and police officials. Calendar year 2006 payroll figures were reduced to reflect retroactive salary payments made in 2006 and increased by approximately 6% for police officials to reflect unsettled bargaining contracts.

SECTION 2: Valuation Results for the City of Worcester Retirement System

A. PARTICIPANT DATA

The Actuarial Valuation and Review considers the number and demographic characteristics of covered participants, including active participants, inactive participants, retired participants and beneficiaries.

This section presents a summary of significant statistical data on these participant groups.

More detailed information for this valuation year and the preceding valuation can be found in Section 3, Exhibits A and B.

A historical perspective of how the participant population has changed over the past ten valuations can be seen in this chart.

CHART 1

Participant Population: 1998 – 2007

Year Ended December 31	Active Participants	Inactive Participants	Retired Participants and Beneficiaries	Ratio of Non-Actives to Actives
1998	3,662	892	3,004	1.06
1999	3,840	826	2,972	0.99
2000	3,910	905	2,950	0.99
2001	4,080	929	2,905	0.94
2002	3,679	1,094	3,001	1.11
2003	3,409	1,102	2,996	1.20
2004	3,498	1,017	2,964	1.14
2005	3,430	1,007	2,919	1.14
2006	3,397	1,072	2,864	1.16
2007	3,299	898	2,849	1.14

SECTION 2: Valuation Results for the City of Worcester Retirement System

Active Participants

Plan costs are affected by the age, years of service and payroll of active participants. In this year's valuation, there were 3,299 active participants with an average age of 46.7, average years of service of 13.4 years and average payroll of \$45,241. The 3,397 active participants in the prior valuation had an average age of 46.3, average service of 12.8 years and average payroll of \$42,902.

Among the active participants, there were none with unknown age and/or service information.

Inactive Participants

In this year's valuation, there were 54 participants with a vested right to a deferred or immediate vested benefit and 844 participants entitled to a return of their employee contributions.

These graphs show a distribution of active participants by age and by years of service.

CHART 2

Distribution of Active Participants by Age as of December 31, 2007

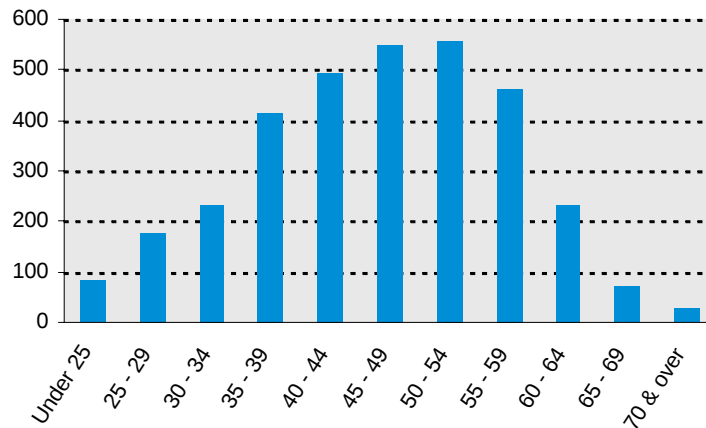
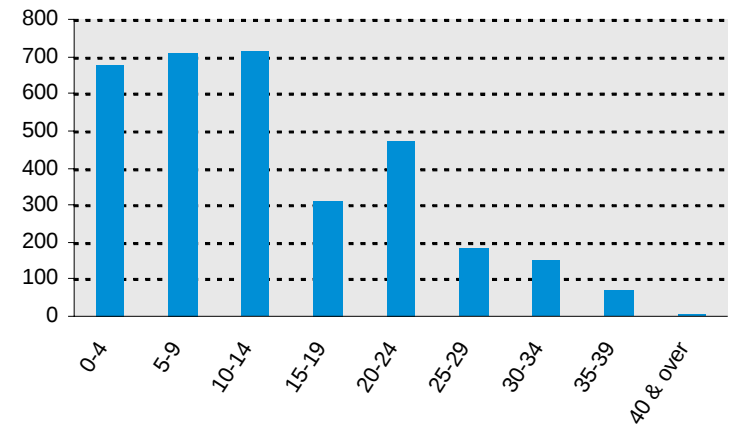


CHART 3

Distribution of Active Participants by Years of Service as of December 31, 2007



SECTION 2: Valuation Results for the City of Worcester Retirement System

Retired Participants and Beneficiaries

As of December 31, 2007, 2,312 retired participants and 537 beneficiaries were receiving total monthly benefits of \$4,419,668 excluding COLAs reimbursed by the Commonwealth. For comparison, in the previous valuation, there were 2,315 retired participants and 549 beneficiaries receiving monthly benefits of \$4,253,226 excluding COLAs reimbursed by the Commonwealth.

These graphs show a distribution of the current retired participants and beneficiaries based on their monthly amount and age, by type of pension.

CHART 4

Distribution of Retired Participants and Beneficiaries by Type and by Monthly Amount as of December 31, 2007

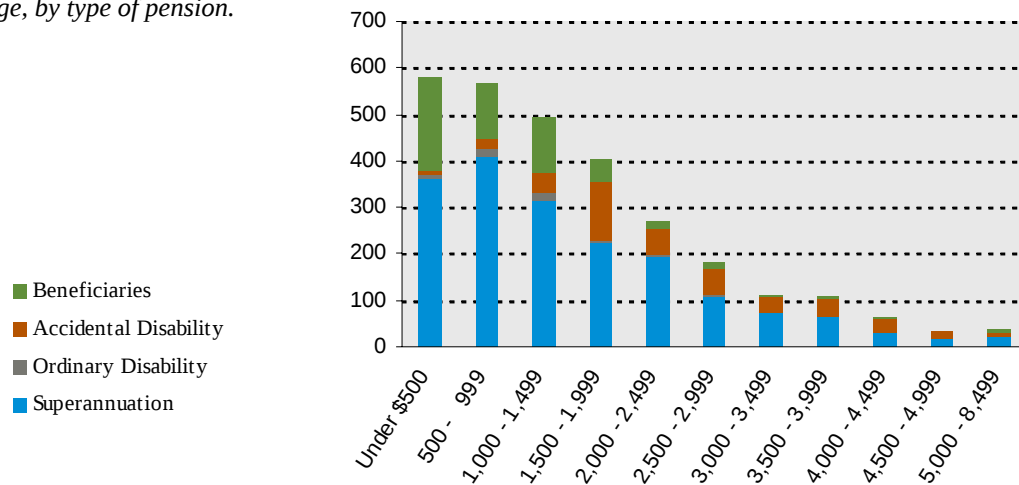
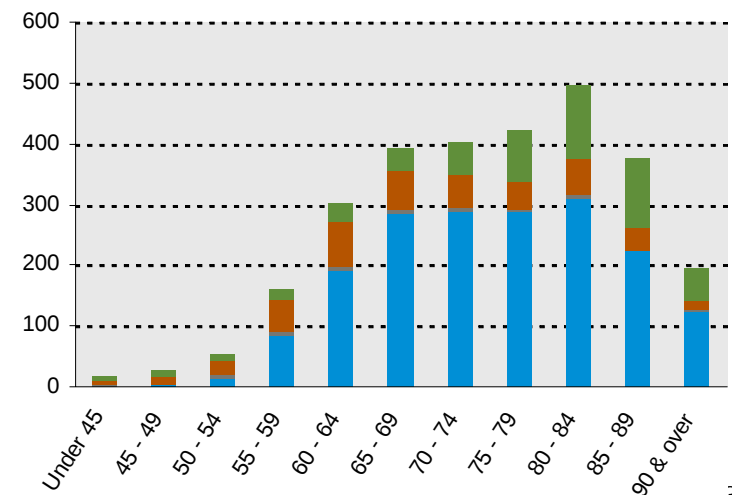


CHART 5

Distribution of Retired Participants and Beneficiaries by Type and by Age as of December 31, 2007



SECTION 2: Valuation Results for the City of Worcester Retirement System

B. FINANCIAL INFORMATION

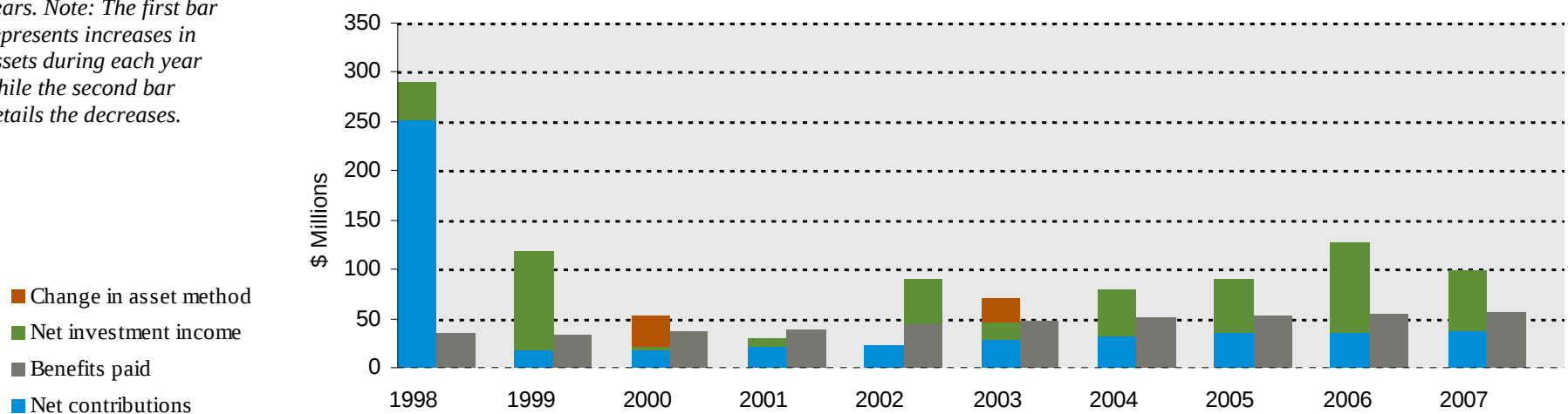
Retirement plan funding anticipates that, over the long term, both net contributions (less administrative expenses) and net investment earnings (less investment fees) will be needed to cover benefit payments.

Retirement plan assets change as a result of the net impact of these income and expense components. Additional financial information, including a summary of these transactions for the valuation year, is presented in Section 3, Exhibits C and D.

The chart depicts the components of changes in the actuarial value of assets over the last ten years. Note: The first bar represents increases in assets during each year while the second bar details the decreases.

CHART 6

Comparison of Increases and Decreases in the Actuarial Value of Assets for Years Ended December 31, 1998 – 2007



SECTION 2: Valuation Results for the City of Worcester Retirement System

In 2000, the Board approved an asset valuation method that gradually adjusts to market value. Under this valuation method, the full value of market fluctuations is not recognized in a single year and, as a result, the asset value and the plan costs are more stable.

In 2005, the actuarial value of assets was set equal to market value. The Board has elected to continue using market value to determine the System's unfunded actuarial accrued liability and funding schedule.

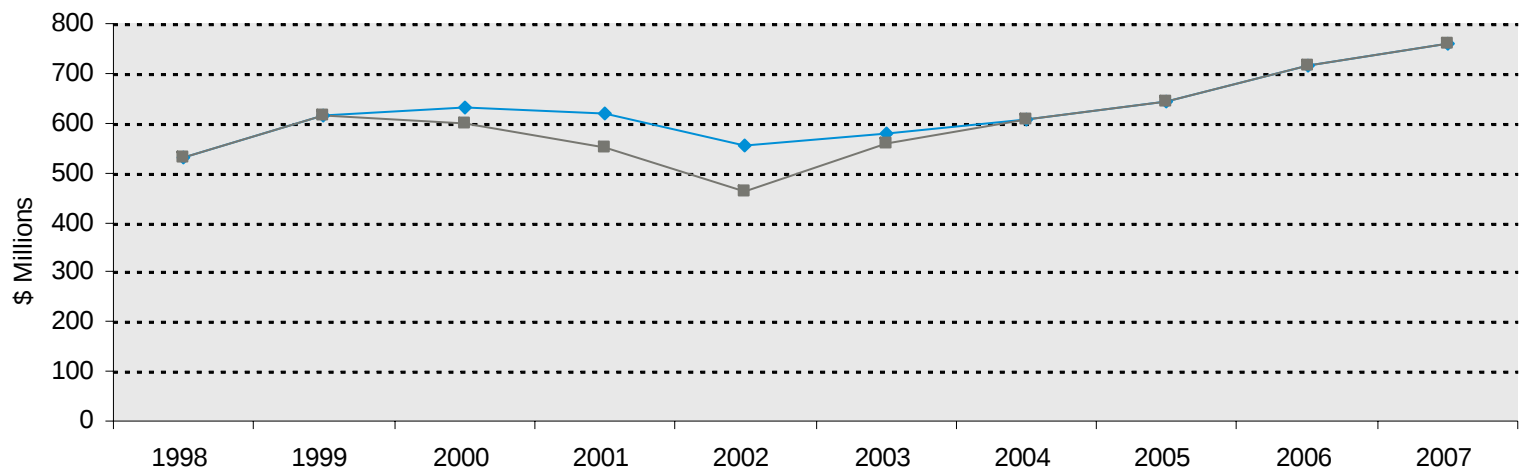
The Board has the option to return to an asset "smoothing" method in the future should they decide the current method (using market value) is producing undesirable fluctuations.

The actuarial asset value is significant because the Worcester Retirement System's liabilities are compared to these assets to determine what portion, if any, remains unfunded. Amortization of the unfunded actuarial accrued liability is an important element in determining the contribution requirement.

This chart shows the actuarial value of assets versus the market value of assets over the past ten years.

CHART 7

Actuarial Value of Assets vs. Market Value of Assets as of December 31, 1998 – 2007



SECTION 2: Valuation Results for the City of Worcester Retirement System

C. ACTUARIAL EXPERIENCE

To calculate the required contribution, assumptions are made about future events that affect the amount and timing of benefits to be paid and assets to be accumulated. Each year actual experience is measured against the assumptions. If overall experience is more favorable than anticipated (an actuarial gain), the contribution requirement will decrease from the previous year. On the other hand, the contribution requirement will increase if overall actuarial experience is less favorable than expected (an actuarial loss).

Taking account of experience gains or losses in one year without making a change in assumptions reflects the belief that the single year's experience was a short-term

development and that, over the long term, experience will return to the original assumptions. For contribution requirements to remain stable, assumptions should approximate experience.

If assumptions are changed, the contribution requirement is adjusted to take into account a change in experience anticipated for all future years.

The total experience gain for the year ended December 31, 2007 is \$1,900,536. A discussion of the major components of the actuarial experience is on the following pages.

This chart provides a summary of the actuarial experience during the past year.

CHART 8

Actuarial Experience for Year Ended December 31, 2007

1. Net gain from investments*	\$3,341,587
2. Net gain from administrative expenses	74,937
3. Net loss from other experience**	<u>-1,515,988</u>
4. Net experience gain: (1) + (2) + (3)	\$1,900,536

* Details in Chart 9

** Details in Chart 12

SECTION 2: Valuation Results for the City of Worcester Retirement System

Investment Rate of Return

A major component of projected asset growth is the assumed rate of return. The assumed return should represent the expected long-term rate of return, based on the Worcester Retirement System's investment policy. For valuation purposes, the assumed rate of return on the actuarial value of assets is 8.25%. The actual rate of return for the 2007 plan year was 8.72%.

Since the actual return for the year was greater than the assumed return, the Worcester Retirement System experienced an actuarial gain during the year ended December 31, 2007 with regard to its investments.

This chart shows the gain due to investment experience.

CHART 9

Actuarial Value Investment Experience for Year Ended December 31, 2007

1. Actual return	\$61,690,401
2. Average value of assets	707,258,351
3. Actual rate of return: (1) ÷ (2)	8.72%
4. Assumed rate of return	8.25%
5. Expected return: (2) x (4)	\$58,348,814
6. Actuarial gain: (1) – (5)	<u>\$3,341,587</u>

SECTION 2: Valuation Results for the City of Worcester Retirement System

Because actuarial planning is long term, it is useful to see how the assumed investment rate of return has followed actual experience over time. The chart below shows the rate of return on an actuarial basis and market value basis for the last ten years, including five-year and ten-year averages.

Based upon this experience and future expectations, we have maintained the assumed rate of return of 8.25%.

CHART 10

Investment Return – Actuarial Value vs. Market Value of Assets: 1998 - 2007

Year Ended December 31	Actuarial Value Investment Return		Market Value Investment Return	
	Amount	Percent	Amount	Percent
1998	\$38,882,211	14.22%	\$38,882,211	14.22%
1999	101,149,011	19.38	101,149,011	19.38
2000	35,128,309	5.80	2,494,022	0.41
2001	8,897,926	1.43	-29,978,425	-5.09
2002	-46,582,424	-7.63	-67,436,801	-12.50
2003	41,670,173	7.65	115,476,574	25.52
2004	47,848,351	8.43	66,406,965	12.09
2005	55,470,778	9.29	55,470,778	9.29
2006	91,535,234	14.42	91,535,234	14.42
2007	<u>61,690,401</u>	8.72	<u>61,690,401</u>	8.72
Total	\$435,689,970		\$435,689,970	
	Five-year average return	9.77%		13.28%
	Ten-year average return	7.66%		7.97%

Notes: Each year's yield is weighted by the average asset value in that year.

2000, 2003 and 2004 actuarial value investment returns include a change in asset method.

SECTION 2: Valuation Results for the City of Worcester Retirement System

Chart 11 shows the actuarial rate of return and the market value rate of return for the past ten years.

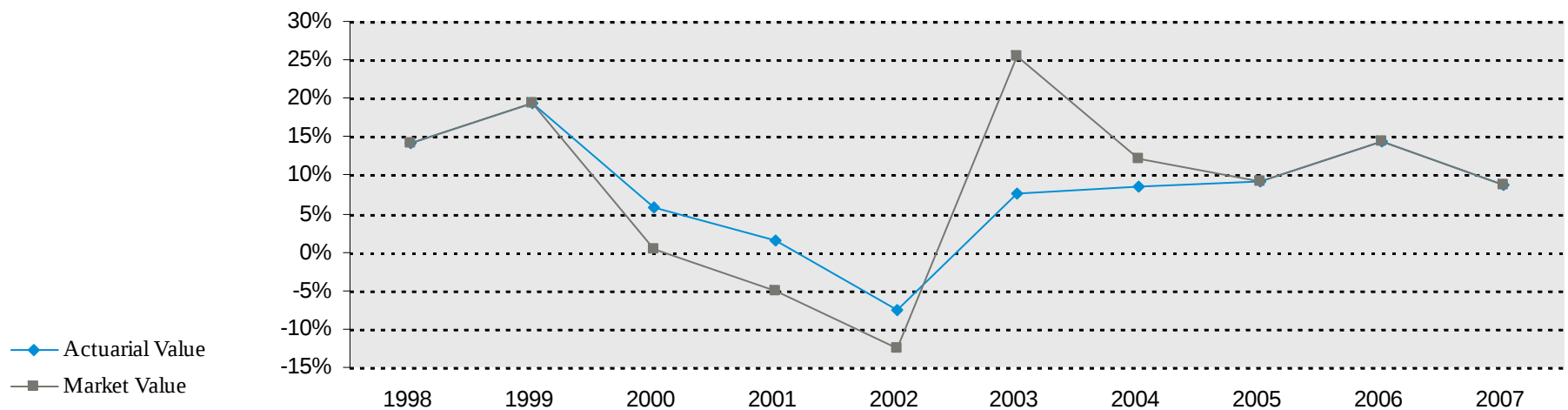
Administrative Expenses

Administrative expenses for the year ended December 31, 2007 totaled \$555,774 compared to the assumption of \$625,000, payable at the beginning of the year. This resulted in a gain of \$74,937 for the year, including an adjustment for timing. We have maintained the assumption of \$625,000 for the current year.

This chart illustrates the rates of return. 2000, 2003 and 2004 include changes in asset method.

CHART 11

Actuarial Rates of Return vs. Market Value Rates of Return for Years Ended December 31, 1998 - 2007



SECTION 2: Valuation Results for the City of Worcester Retirement System

Other Experience

There are other differences between the expected and the actual experience that appear when the new valuation is compared with the projections from the previous valuation. These include:

- the extent of turnover among the participants,
- retirement experience (earlier or later than expected),
- mortality (more or fewer deaths than expected),
- the number of disability retirements, and
- salary increases different than assumed.

The net loss from this other experience for the year ended

December 31, 2007 amounted to \$1,515,988 which is 0.2% of the actuarial accrued liability. Detail is shown in the chart below.

As noted earlier, an estimated liability of \$16.3 million was included to account for anticipated net 3(8)(c) reimbursements. In addition, the date of hire reported in the data is being used to determine service and entry age. Adjusted date of hire was used in the prior valuation.

The chart shows elements of the experience gain/(loss) for the most recent year.

CHART 12

Experience Due to Changes in Demographics for Year Ended December 31, 2007

1. Deaths among retired members and beneficiaries	-\$2,397,791
2. Salary increases greater than expected	-958,121
3. Miscellaneous experience	<u>1,839,924</u>
4. Total	-\$1,515,988

SECTION 2: Valuation Results for the City of Worcester Retirement System

D. RECOMMENDED CONTRIBUTION

The amount of annual contribution required to fund the Plan is comprised of an employer normal cost payment and a payment on the unfunded actuarial accrued liability.

We have determined a preliminary 2009 appropriation of \$25,187,339 based on a funding schedule that amortizes the 2002 ERI in level dollar amounts through fiscal 2018 (10 payments remaining), the 2003 ERI in level dollar amounts through fiscal 2012 (four payments remaining), the Section 90 ACD liability in level dollar amounts through fiscal 2014 (six payments remaining), and the remaining unfunded liability in increasing payments (4.0% per year) through fiscal 2019 (11 payments remaining). In

the prior funding schedule, the remaining unfunded liability was amortized in increasing (3.5% per year) payments through fiscal 2018.

Because the fiscal 2009 appropriation has already been budgeted at \$24,947,158, the results of this valuation will first be reflected in the fiscal 2010 appropriation of \$26,099,353 which represents an increase of 4.6% over fiscal 2009.

The chart compares this valuation's recommended contribution with the prior valuation.

CHART 13

Recommended Contribution

	Year Beginning January 1			
	2008		2007	
	Amount	% of Payroll	Amount	% of Payroll
1. Total normal cost	\$21,949,842	14.02%	\$21,497,545	14.07%
2. Administrative expenses	625,000	0.40%	625,000	0.41%
3. Expected employee contributions	<u>-13,651,245</u>	<u>-8.72%</u>	<u>-13,174,272</u>	<u>-8.62%</u>
4. Employer normal cost: (1) + (2) + (3)	\$8,923,597	5.70%	\$8,948,273	5.85%
5. Actuarial accrued liability	889,924,310		837,608,233	
6. Actuarial value of assets	<u>759,410,332</u>		<u>716,796,770</u>	
7. Unfunded actuarial accrued liability: (5) - (6)	\$130,513,978		\$120,811,463	
8. Employer normal cost projected to July 1, 2008 and 2007	9,100,319	5.70%	9,125,484	5.85%
9. Projected unfunded actuarial accrued liability	135,790,998		125,696,185	
10. Payment on projected unfunded actuarial accrued liability	16,087,020	10.07%	15,040,834	9.65%
11. Preliminary recommended contribution: (8) + (10)	25,187,339	15.77%	24,166,318	15.50%
12. Budgeted appropriation	<u>\$24,947,158</u>	<u>15.62%</u>	<u>\$24,166,318</u>	<u>15.50%</u>
13. Projected payroll	\$159,686,327		\$155,864,994	

Note: Recommended contributions are assumed to be paid at the beginning of the fiscal year.

SECTION 2: Valuation Results for the City of Worcester Retirement System

The recommended contribution is based on all of the data described in the previous sections, the actuarial assumptions described in Section 4, and the Plan provisions adopted at the time of preparation of the Actuarial Valuation. They include all changes affecting future costs, adopted benefit changes, actuarial gains and losses and changes in the actuarial assumptions.

Reconciliation of Recommended Contribution

The chart below details the changes in the recommended contribution from the prior valuation to the current year's valuation.

The chart reconciles the contribution from the prior valuation to the amount determined in this valuation.

CHART 14

Reconciliation of Recommended Contribution from July 1, 2007 to July 1, 2008

Budgeted appropriation for fiscal 2008	\$24,166,318
Expected increase	\$780,840
Effect of investment gain	-421,949
Effect of loss from salary increases greater than expected	120,984
Effect of loss from deaths among retired members and beneficiaries	302,774
Effect of adding liability for net 3(8)(c) reimbursements	2,058,943
Effect of lower than expected normal cost	-328,408
Effect of changes to funding schedule	-1,312,272
Effect of net other changes	<u>-179,891</u>
Total change	<u>\$1,021,021</u>
Preliminary recommended contribution for fiscal 2009	\$25,187,339
Budgeted appropriation for fiscal 2009	\$24,947,158

SECTION 2: Valuation Results for the City of Worcester Retirement System

E. INFORMATION REQUIRED BY THE GASB

Governmental Accounting Standards Board (GASB) reporting information provides standardized information for comparative purposes of governmental pension plans. This information allows a reader of the financial statements to compare the funding status of one governmental plan to another on relatively equal terms.

Critical information to the GASB is the historical comparison of the GASB required contributions to the actual contributions. This comparison demonstrates whether a plan is being funded within the range of the GASB reporting requirements. Chart 15 below presents a graphical representation of this information for the Plan.

The other critical piece of information regarding the Plan's financial status is the funded ratio. This ratio compares the

actuarial value of assets to the actuarial accrued liabilities of the plan as calculated under the GASB. High ratios indicate a well-funded plan with assets sufficient to pay most benefits. Lower ratios may indicate recent changes to benefit structures, funding of the plan below actuarial requirements, poor asset performance, or a variety of other factors.

Although the GASB requires that the actuarial value of assets be used to determine the funded ratio, Chart 16 shows the funded ratio calculated using both the actuarial value of assets and the market value of assets (85.33%).

The details regarding the calculations of these values and other GASB numbers may be found in Section 4, Exhibits II, III, and IV.

These graphs show key GASB factors.

CHART 15
Required Versus Actual Contributions

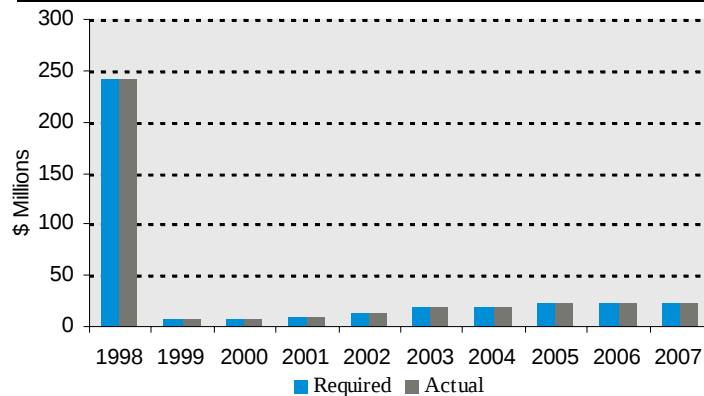
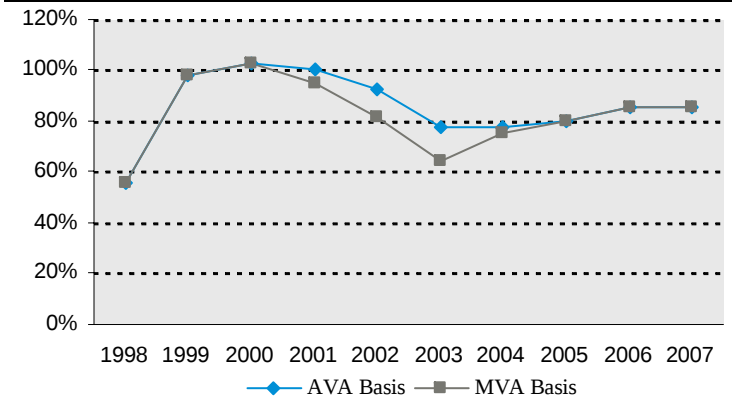


CHART 16
Funded Ratio



SECTION 3: Supplemental Information for the City of Worcester Retirement System

EXHIBIT A

Table of Plan Coverage

	Year Ended December 31		Change From Prior Year
Category	2007	2006	
Active participants in valuation:			
Number	3,299	3,397	-2.9%
Average age	46.7	46.3	N/A
Average service	13.4	12.8	N/A
Total payroll*	\$149,249,401	\$145,737,036	2.4%
Average payroll*	45,241	42,902	5.5%
Member contributions	138,196,374	132,470,791	4.3%
Inactive participants entitled to a return of their employee contributions	844	1,016	-16.9%
Inactive participants with a vested right to a deferred or immediate vested benefit	54	56	-3.6%
Retired participants:			
Number in pay status	1,815	1,823	-0.4%
Average age	75.0	74.9	N/A
Average monthly benefit	\$1,498	\$1,442	3.9%
Disabled participants:			
Number in pay status	497	492	1.0%
Average age	69.0	69.1	N/A
Average monthly benefit	\$2,318	\$2,223	4.3%
Beneficiaries in pay status	537	549	-2.2%

* Calendar year 2007 payroll figures were reduced to reflect retroactive salary payments made in 2007 for firefighters and police officials. Calendar year 2006 payroll figures were reduced to reflect retroactive salary payments made in 2006 and increased by approximately 6% for police officials to reflect unsettled bargaining contracts.

SECTION 3: Supplemental Information for the City of Worcester Retirement System

EXHIBIT B

Participants in Active Service as of December 31, 2007 By Age, Years of Service, and Average Payroll

Age	Years of Service									
	Total	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40 & over
Under 25	84	79	5	--	--	--	--	--	--	--
	\$27,117	\$26,816	\$31,862	--	--	--	--	--	--	--
25 – 29	176	137	36	3	--	--	--	--	--	--
	\$37,350	\$38,657	\$32,870	\$31,372	--	--	--	--	--	--
30 – 34	234	107	94	33	--	--	--	--	--	--
	\$44,808	\$40,563	\$48,347	\$48,489	--	--	--	--	--	--
35 – 39	414	99	131	152	28	4	--	--	--	--
	\$48,558	\$35,150	\$45,905	\$59,805	\$48,175	\$42,562	--	--	--	--
40 – 44	492	95	121	150	59	64	3	--	--	--
	\$47,036	\$32,238	\$35,942	\$56,016	\$58,413	\$57,614	\$64,639	--	--	--
45 – 49	550	56	124	138	76	131	21	4	--	--
	\$44,992	\$30,466	\$30,620	\$40,843	\$50,167	\$64,042	\$57,100	\$51,255	--	--
50 – 54	555	54	87	114	61	117	78	43	1	--
	\$46,376	\$34,707	\$31,945	\$38,271	\$38,284	\$54,207	\$65,475	\$67,444	\$37,736	--
55 – 59	462	33	66	64	44	95	56	71	32	1
	\$49,078	\$40,280	\$33,674	\$40,161	\$41,006	\$44,857	\$63,442	\$67,729	\$65,049	\$43,111
60 – 64	232	9	34	40	34	37	14	27	34	3
	\$43,735	\$40,077	\$38,236	\$34,741	\$36,765	\$38,762	\$39,532	\$55,815	\$65,331	\$43,449
65 – 69	72	4	9	16	9	17	9	2	4	2
	\$34,505	\$30,216	\$28,005	\$32,642	\$39,871	\$32,540	\$36,962	\$45,733	\$35,834	\$54,847
70 & over	28	1	2	6	3	7	3	4	1	1
	\$31,404	\$22,427	\$19,462	\$21,500	\$32,563	\$37,234	\$56,003	\$27,250	\$26,808	\$26,808
Total	3,299	674	709	716	314	472	184	151	72	7
	\$45,241	\$35,179	\$37,573	\$47,203	\$46,032	\$53,175	\$60,364	\$63,718	\$62,649	\$44,280

Note: Calendar year 2007 payroll figures were reduced to reflect retroactive salary payments made in 2007 for firefighters and police officials.

SECTION 3: Supplemental Information for the City of Worcester Retirement System

EXHIBIT C

Summary Statement of Income and Expenses on an Actuarial Value Basis

	Year Ended December 31, 2007	Year Ended December 31, 2006
Contribution income:		
Employer contributions	\$24,166,318	\$23,354,603
Employee contributions	12,829,448	12,607,303
Less administrative expenses	<u>-555,774</u>	<u>-621,648</u>
Net contribution income	\$36,439,992	\$35,340,258
Net investment income	<u>61,690,401</u>	<u>91,535,234</u>
Total income available for benefits	\$98,130,393	\$126,875,492
Less benefit payments:		
Pensions	-\$48,393,417	-\$46,998,684
Net 3(8)(c) reimbursements	-1,562,005	-2,425,761
Refunds, annuities and Option B refunds	-7,988,219	-7,300,836
State reimbursements	<u>2,426,810</u>	<u>2,630,055</u>
Net benefit payments	-\$55,516,831	-\$54,095,226
Change in reserve for future benefits	\$42,613,562	\$72,780,266

SECTION 3: Supplemental Information for the City of Worcester Retirement System

EXHIBIT D

Development of the Fund Through December 31, 2007

Year Ended December 31	Employer Contributions	Employee Contributions	Other Contributions	Net Investment Return*	Administrative Expenses	Benefit Payments	Actuarial Value of Assets at End of Year
1998	--	--	--	--	--	--	\$529,999,363
1999	\$8,205,319	\$9,632,389	0	\$101,149,011	\$383,162	\$33,708,000	614,894,920
2000	8,280,410	10,219,772	0	35,128,309	391,295	37,417,498	630,714,618
2001	9,480,000	11,481,856	\$3,471	8,897,926	462,010	39,301,554	620,814,307
2002	12,956,778	11,182,339	0	-46,582,424	573,697	43,607,213	554,190,090
2003	18,928,252	10,333,125	0	41,670,173	440,295	47,558,278	577,123,067
2004	20,150,377	11,692,796	0	47,848,351	518,078	50,196,897	606,099,616
2005	23,579,478	11,905,078	0	55,470,778	556,781	52,481,665	644,016,504
2006	23,354,603	12,607,303	0	91,535,234	621,648	54,095,226	716,796,770
2007	24,166,318	12,829,448	0	61,690,401	555,774	55,516,831	759,410,332

* Net of investment expenses. Reflects changes in asset method in 2000, 2003 and 2004.

SECTION 3: Supplemental Information for the City of Worcester Retirement System

EXHIBIT E

Development of Unfunded Actuarial Accrued Liability for Year Ended December 31, 2007

1. Unfunded actuarial accrued liability at beginning of year		\$120,811,463
2. Normal cost at beginning of year		22,122,545
3. Total contributions		-36,995,766
4. Interest		
(a) For whole year on (1) + (2)	\$11,792,055	
(b) For half year on (3)	<u>-1,378,882</u>	
(c) Total interest		<u>10,413,173</u>
5. Expected unfunded actuarial accrued liability		\$116,351,415
6. Changes due to:		
(a) Additional liability for net 3(8)(c) reimbursements	\$16,305,621	
(b) Service assumption change	-495,847	
(c) Investment gain	-3,341,587	
(d) Fewer deaths than expected among retired members and beneficiaries	2,397,791	
(e) Greater than expected salary increases	958,121	
(f) Administrative expense gain	-74,937	
(g) Miscellaneous gain	<u>-1,586,599</u>	
(h) Total changes		<u>14,162,563</u>
7. Unfunded actuarial accrued liability at end of year: (5) + (6h)		<u>\$130,513,978</u>

SECTION 3: Supplemental Information for the City of Worcester Retirement System

EXHIBIT F

Table of Amortization Bases as of July 1, 2008

Type	Annual Payment	Rate of Increase	Years Remaining	Outstanding Balance
2002 ERI	\$1,557,632	0.0%	10	\$11,187,635
2003 ERI	485,625	0.0%	4	1,731,505
Section 90 ACD liability	1,116,983	0.0%	6	5,547,539
Remaining unfunded liability	<u>12,926,780</u>	4.0%	11	<u>117,324,319</u>
Total	\$16,087,020			\$135,790,998

*Note: Recommended contributions are assumed to be paid at the beginning of the fiscal year.
Does not reflect adjustment to set fiscal 2009 appropriation to budgeted amount.*

SECTION 3: Supplemental Information for the City of Worcester Retirement System

EXHIBIT G

Funding Schedule

(1) Fiscal Year Ended June 30	(2) Employer Normal Cost	(3) Amortization of 2002 ERI Liability	(4) Amortization of 2003 ERI Liability	(5) Amortization of Section 90 ACD Liability	(6) Amortization of Remaining Unfunded Liability	(7) Total Plan Cost: (2) + (3) + (4) + (5) + (6)	(8) Total Unfunded Actuarial Accrued Liability at the Beginning of the Year
2009	\$9,100,319	\$1,557,632	\$485,625	\$1,116,983	\$12,686,599	\$24,947,158	\$135,790,998
2010	9,464,332	1,557,632	485,625	1,116,983	13,474,781	26,099,353	129,839,552
2011	9,842,905	1,557,632	485,625	1,116,983	14,013,772	27,016,917	122,543,905
2012	10,236,621	1,557,632	485,625	1,116,983	14,574,323	27,971,184	114,062,909
2013	10,646,086	1,557,632	-	1,116,983	15,157,296	28,477,997	104,275,435
2014	11,071,929	1,557,632	-	1,116,983	15,763,588	29,510,132	93,575,115
2015	11,514,806	1,557,632	-	-	16,394,132	29,466,570	81,335,707
2016	11,975,398	1,557,632	-	-	17,049,897	30,582,927	68,613,118
2017	12,454,414	1,557,632	-	-	17,731,893	31,743,939	54,131,050
2018	12,952,591	1,557,632	-	-	18,441,169	32,951,392	37,715,951
2019	13,470,695	-	-	-	19,178,816	32,649,511	19,178,815
2020	14,009,523	-	-	-	-	14,009,523	-
2021	14,569,904	-	-	-	-	14,569,904	-
2022	15,152,700	-	-	-	-	15,152,700	-
2023	15,758,808	-	-	-	-	15,758,808	-
2024	16,389,160	-	-	-	-	16,389,160	-
2025	17,044,726	-	-	-	-	17,044,726	-
2026	17,726,515	-	-	-	-	17,726,515	-
2027	18,435,576	-	-	-	-	18,435,576	-
2028	19,172,999	-	-	-	-	19,172,999	-

Notes: Assumes payment at the beginning of the fiscal year.

Normal cost and expenses are assumed to increase at 4.0% per year.

Amortization payments on the remaining unfunded liability calculated to increase at 4.0% per year.

SECTION 3: Supplemental Information for the City of Worcester Retirement System

EXHIBIT H

Department Allocations of 2002 and 2003 ERI Amortization Payments and Section 90 ACD Amortization Payments

The total budgeted employer contribution, excluding the ERI and Section 90 ACD amortizations, is \$21,879,254. This amount will be allocated to each department based on September 30 payroll. The ERI and Section 90 ACD amortizations are allocated to each department based on actual ERI and Section 90 ACD participants, as shown below.

Department Allocation of ERI Amortizations

Department	Allocation of 2002 ERI Amortization	Allocation of 2003 ERI Amortization	Allocation of Section 90 ACD Amortization
DPW – Other	--	\$110,745	\$20,817
DPW – Sewer	\$74,604	40,800	11,358
DPW – Water	99,053	18,186	25,864
Fire	297,106	--	426,980
Housing Authority	148,593	--	--
Police	112,960	--	366,575
Public Schools	356,312	113,388	49,667
Other	<u>469,004</u>	<u>202,506</u>	<u>215,722</u>
Total Fiscal Year 2009 Payment	\$1,557,632	\$485,625	\$1,116,983

SECTION 3: Supplemental Information for the City of Worcester Retirement System

EXHIBIT I

Definitions of Pension Terms

The following list defines certain technical terms for the convenience of the reader:

Assumptions or actuarial assumptions:

The estimates on which the cost of the Plan is calculated including:

- (a) Investment return — the rate of investment yield that the Plan will earn over the long-term future;
- (b) Mortality rates — the death rates of employees and pensioners; life expectancy is based on these rates;
- (c) Retirement rates — the rate or probability of retirement at a given age;
- (d) Turnover rates — the rates at which employees of various ages are expected to leave employment for reasons other than death, disability, or retirement.

Normal cost:

The amount of contributions required to fund the benefit allocated to the current year of service.

Actuarial accrued liability for actives:

The equivalent of the accumulated normal costs allocated to the years before the valuation date.

Actuarial accrued liability for pensioners:

The single sum value of lifetime benefits to existing pensioners. This sum takes account of life expectancies appropriate to the ages of the pensioners and the interest that the sum is expected to earn before it is entirely paid out in benefits.

Unfunded actuarial accrued liability:

The extent to which the actuarial accrued liability of the Plan exceeds the assets of the Plan. There are many approaches to paying off the unfunded actuarial accrued liability, from meeting the interest accrual only to amortizing it over a specific period of time.

SECTION 3: Supplemental Information for the City of Worcester Retirement System

**Amortization of the unfunded
actuarial accrued liability:**

Payments made over a period of years equal in value to the Plan's unfunded actuarial accrued liability.

Investment return:

The rate of earnings of the Plan from its investments, including interest, dividends and capital gain and loss adjustments, computed as a percentage of the average value of the fund. For actuarial purposes, the investment return often reflects a smoothing of the capital gains and losses to avoid significant swings in the value of assets from one year to the next.

SECTION 4: Reporting Information for the City of Worcester Retirement System

EXHIBIT I

Summary of Actuarial Valuation Results

The valuation was made with respect to the following data supplied to us:

1. Retired participants as of the valuation date (including 537 beneficiaries in pay status)	2,849
2. Participants active during the year ended December 31, 2007 with total accumulated contributions of \$138,196,374 and projected payroll of \$156,585,326	3,299
3. Inactive participants with a right to a return of their employee contributions as of December 31, 2007	844
4. Inactive participants with a vested right to a deferred or immediate benefit as of December 31, 2007	54

The actuarial factors as of January 1, 2008 are as follows:

1. Normal cost, including administrative expenses	\$22,574,842
2. Expected employer contributions	<u>-13,651,245</u>
3. Employer normal cost: (1) + (2)	\$8,923,597
4. Actuarial accrued liability	889,924,310
Retired participants and beneficiaries	\$476,412,539
Active participants	406,727,483
Inactive participants	6,784,288
5. Actuarial value of assets (\$759,410,332 at market value as reported in the Annual Statement)	759,410,332
6. Unfunded actuarial accrued liability: (4) – (5)	130,513,978

The actuarial factors projected to July 1, 2008 are as follows:

1. Employer normal cost projected to July 1, 2008	\$9,100,319
2. Projected unfunded actuarial accrued liability	135,790,998
3. Payment on projected unfunded actuarial accrued liability	16,087,020
4. Preliminary recommended contribution: (1) + (3)	25,187,339
5. Budgeted appropriation	24,947,158
6. Projected payroll	\$159,686,327
7. Total recommended contribution as a percentage of projected payroll: (5) ÷ (6)	15.62%

Note: Recommended contributions are assumed to be paid at the beginning of the fiscal year.

SECTION 4: Reporting Information for the City of Worcester Retirement System

EXHIBIT II

Supplementary Information Required by the GASB – Schedule of Employer Contributions

Plan Year Ended December 31	Annual Required Contributions	Actual Contributions	Percentage Contributed
1998	\$241,213,831	\$241,213,831	100.0%
1999	8,188,518	8,188,518	100.0%
2000	8,280,410	8,280,410	100.0%
2001	9,480,000	9,480,000	100.0%
2002	12,956,778	12,956,778	100.0%
2003	18,928,252	18,928,252	100.0%
2004	20,150,377	20,150,377	100.0%
2005	22,228,892	23,579,478	106.1%
2006	23,316,836	23,354,603	100.2%
2007	24,166,318	24,166,318	100.0%

SECTION 4: Reporting Information for the City of Worcester Retirement System

EXHIBIT III

Supplementary Information Required by the GASB – Schedule of Funding Progress

Actuarial Valuation Date	Actuarial Value of Assets (a)	Actuarial Accrued Liability (AAL) (b)	Unfunded/ (Overfunded) AAL (UAAL) (b) - (a)	Funded Ratio (a) / (b)	Covered Payroll (c)	UAAL as a Percentage of Covered Payroll [(b) - (a)] / (c)
01/01/1999	\$529,999,363	\$538,803,009	\$8,803,646	98.37%	\$115,742,392	7.61%
01/01/2000	614,894,920	598,179,134	-16,715,786	102.79%	130,376,689	-12.82%
01/01/2001	630,714,618	628,681,483	-2,033,135	100.32%	136,000,517	-1.49%
01/01/2002	620,814,307	671,876,943	51,062,636	92.40%	148,764,543	34.32%
01/01/2003	554,190,090	715,855,564	161,665,474	77.42%	142,802,508	113.21%
01/01/2004	577,123,067	743,570,440	166,447,373	77.62%	138,796,895	119.92%
01/01/2005	606,099,616	771,948,311	165,848,695	78.52%	147,126,606	112.73%
01/01/2006	644,016,504	806,957,464	162,940,960	79.81%	145,830,593	111.73%
01/01/2007	716,796,770	837,608,233	120,811,463	85.58%	152,838,201	79.05%
01/01/2008	759,410,332	889,924,310	130,513,978	85.33%	156,585,326	83.35%

SECTION 4: Reporting Information for the City of Worcester Retirement System

EXHIBIT IV

Supplementary Information Required by the GASB

Valuation date	January 1, 2008
Actuarial cost method	Entry Age Normal Cost Method
Amortization method	Level payments on the 2002 and 2003 ERI liability and the Section 90 ACD liability and 4.0% increasing payments on the remaining unfunded liability
Remaining amortization period	10 years for the 2002 ERI liability 4 years for the 2003 ERI liability 6 years for the Section 90 ACD liability and 11 years for the remaining unfunded liability
Asset valuation method	Market value

Actuarial assumptions:	
Investment rate of return	8.25%
Projected salary increases	5.00%
Cost of living adjustments	3.00% of first \$12,000 of retirement income

Plan membership:	
Retired participants and beneficiaries receiving benefits	2,849
Inactive participants entitled to a return of their employee contributions	844
Inactive participants with a vested right to a deferred or immediate benefit	54
Active participants	<u>3,299</u>
Total	7,046

SECTION 4: Reporting Information for the City of Worcester Retirement System

EXHIBIT V

Actuarial Assumptions and Actuarial Cost Method

Mortality Rates:

<i>Healthy:</i>	1994 Group Annuity Mortality Table
<i>Disabled:</i>	1994 Group Annuity Mortality Table set forward 10 years

Termination Rates before Retirement:

Age	Rate (%)			
	Mortality		Groups 1 and 2	
	Male	Female	Disability	Withdrawal
20	0.05	0.03	0.02	12.00
25	0.07	0.03	0.03	8.78
30	0.08	0.04	0.04	5.55
35	0.09	0.05	0.05	3.93
40	0.11	0.07	0.07	2.31
45	0.16	0.10	0.13	1.89
50	0.26	0.14	0.19	1.46
55	0.44	0.23	0.29	0.00
60	0.80	0.44	0.38	0.00

Notes: 55% of the disability rates shown represent accidental disability.
20% of the accidental disabilities will die from the same cause as the disability.
55% of the death rates shown represent accidental death.

SECTION 4: Reporting Information for the City of Worcester Retirement System

Age	Mortality		Group 4	
	Male	Female	Disability	Withdrawal
20	0.05	0.03	0.08	2.10
25	0.07	0.03	0.12	1.88
30	0.08	0.04	0.17	1.65
35	0.09	0.05	0.41	1.11
40	0.11	0.07	0.65	0.56
45	0.16	0.10	0.89	0.28
50	0.26	0.14	1.13	0.00
55	0.44	0.23	1.33	0.00
60	0.80	0.44	1.53	0.00

Notes: 90% of the disability rates shown represent accidental disability.
60% of the accidental disabilities will die from the same cause as the disability.
90% of the death rates shown represent accidental death.

Retirement Rates:

Rate (%)			
Age	Groups 1 and 2	Age	Group 4
55	12.55	50	32.00
56	3.21	51	7.21
57	3.10	52	5.90
58	3.34	53	8.00
59	3.48	54	7.71
60	7.84	55	15.51
61	6.92	56	9.11
62	15.11	57	9.09
63	10.71	58	11.90
64	10.37	59	11.42
65	35.68	60	23.95
66	22.14	61	13.60

SECTION 4: Reporting Information for the City of Worcester Retirement System

Retirement Rates (continued):

		Rate (%)	
Age	Groups 1 and 2	Age	Group 4
67	21.59	62	19.50
68	21.64	63	12.53
69	25.36	64	18.73
70	100.00	65	100.00

Unknown Data for Participants: Same as those exhibited by participants with similar known characteristics.

Age of Spouse: Females 3 years younger than their spouses.

Percent Married: 80%

Net Investment Return: 8.25%

Salary Increases:

Age	Present salary as a percent of salary at 65	Annual increase rate (%)
20	11.13%	5.00
25	14.20	5.00
30	18.13	5.00
35	23.14	5.00
40	29.53	5.00
45	37.69	5.00
50	48.10	5.00
55	61.39	5.00
60	78.35	5.00

Includes allowance for inflation of 4.00%.

Administrative Expenses: \$625,000 for calendar 2008

SECTION 4: Reporting Information for the City of Worcester Retirement System

2007 Salary:	2007 salary equal to salaries provided in the data, except for new hires where salaries were calculated from annualized contributions divided by the contribution rate(s) reported. The salaries of firefighters and police officials were adjusted for retroactive pay amounts.
Total Service:	Total creditable service based on date of hire. (Previously, total creditable service based on adjusted date of hire, except special cases where date of hire was used.)
Net 3(8)(c) Liability:	Estimated liability of \$16.3 million based on estimated net annual benefits of \$1.9 million.
Actuarial Value of Assets:	Market value of assets as reported in the System's Annual Statement.
Actuarial Cost Method:	Entry Age Normal Actuarial Cost Method. Entry Age is the age of the participant at the Date of Hire. Normal Cost and Actuarial Accrued Liability are calculated on an individual basis and are allocated by salary.

SECTION 4: Reporting Information for the City of Worcester Retirement System

EXHIBIT VI

Summary of Plan Provisions

This exhibit summarizes the major provisions of Chapter 32 of the Laws of Massachusetts.

Plan Year: January 1 – December 31

Retirement Benefits

Employees covered by the Contributory Retirement Law are classified into one of four groups depending on job classification. Group 1 comprises most positions in state and local government. It is the general category of public employees. Group 4 comprises mainly police and firefighters. Group 2 is for other specified hazardous occupations. (Officers and inspectors of the State Police are classified as Group 3.)

The annual amount of the retirement allowance is based on the member's final three-year average salary multiplied by the number of years and full months of creditable service at the time of retirement and multiplied by a percentage according to the following table based on the age of the member at retirement:

Age Last Birthday at Date of Retirement			
Percent	Group 1	Group 2	Group 4
2.5	65 or over	60 or over	55 or over
2.4	64	59	54
2.3	63	58	53
2.2	62	57	52
2.1	61	56	51
2.0	60	55	50
1.9	59	--	49
1.8	58	--	48
1.7	57	--	47
1.6	56	--	46
1.5	55	--	45

A member's final three-year average salary is defined as the greater of the highest consecutive three-year average annual rate of regular compensation and the average

SECTION 4: Reporting Information for the City of Worcester Retirement System

annual rate of regular compensation received during the last three years of creditable service prior to retirement. The \$30,000 cap on salary used in a benefit determination for any employee hired after January 1, 1979 has been removed.

The maximum annual amount of the retirement allowance is 80 percent of the member's final three-year average salary. Any member who is a veteran also receives an additional yearly retirement allowance of \$15 per year of creditable service, not exceeding \$300. The veteran allowance is paid in addition to the 80 percent maximum.

Employee Contributions

<u>Date of Hire</u>	<u>Contribution Rate</u>
Prior to January 1, 1975	5%
January 1, 1975 – December 31, 1983	7%
January 1, 1984 – June 30, 1996	8%
July 1, 1996 onward	9%

In addition, employees hired after December 31, 1978 contribute an additional 2 percent of salary in excess of \$30,000.

Employees hired after 1983 who leave with less than five years of credited service receive no interest on their contributions, and employees who leave with five but less than ten years receive one-half the rate of regular interest otherwise payable.

Retirement Benefits (Superannuation)

Members of Group 1, 2 or 4 may retire upon the attainment of age 55. For retirement at ages below 55, twenty years of creditable service is required.

Members who terminate before age 55 with ten or more years of creditable service are eligible for a retirement allowance upon the attainment of age 55 (provided they have not withdrawn their accumulated deductions from the Annuity Savings Fund of the System).

SECTION 4: Reporting Information for the City of Worcester Retirement System

Ordinary Disability Benefits

A member who is unable to perform his or her job due to a non-occupational disability will receive a retirement allowance if he or she has ten or more years of creditable service and has not reached age 55. The annual amount of such allowance shall be determined as if the member retired for superannuation at age 55, based on the amount of creditable service at the date of disability. For veterans, there is a minimum benefit of 50 percent of the member's most recent year's pay plus an annuity based on his or her own contributions.

Accidental Disability Benefit

For a job-connected disability, the benefit is 72 percent of the member's most recent annual pay plus an annuity based on his or her own contributions, plus additional amounts for surviving children. Benefits are capped at 75 percent of annual rate of regular compensation for employees who become members after January 1, 1988.

Death Benefits

In general, the beneficiary of an employee who dies in active service will receive a refund of the employee's own contributions. Alternatively, if the employee were eligible to retire on the date of death, a spouse's benefit will be paid equal to the amount the employee would have received under Option C. The surviving spouse of a member who dies with two or more years of credited service has the option of a refund of the employee's contributions or a monthly benefit regardless of eligibility to retire, if they were married for at least one year. There is also a minimum widow's pension of \$500 per month, and there are additional amounts for surviving children.

If an employee's death is job-connected, the spouse will receive 72 percent of the member's most recent annual pay, in addition to a refund of the member's accumulated deductions, plus additional amounts for surviving children. However, in accordance with Section 100 of Chapter 32, the surviving spouse of a police officer, firefighter or corrections officer is killed in the line of duty will be eligible to receive an annual benefit equal to the maximum salary held by the member at the time of death.

SECTION 4: Reporting Information for the City of Worcester Retirement System

"Heart And Lung Law" And Cancer Presumption

Any case of hypertension or heart disease resulting in total or partial disability or death to a uniformed fireman, permanent member of a police department, or certain employees of a county correctional facility is presumed to have been suffered in the line of duty, unless the contrary is shown by competent evidence. Any case of disease of the lungs or respiratory tract resulting in total disability or death to a uniformed fireman is presumed to have been suffered in the line of duty, unless the contrary is shown by competent evidence. There is an additional presumption for uniformed firemen that certain types of cancer are job-related if onset occurs while actively employed or within five years of retirement.

Options

Members may elect to receive a full retirement allowance payable for life under Option A. Under Option B a member may elect to receive a lower monthly allowance in exchange for a guarantee that at the time of death any contributions not expended for annuity payments will be refunded to the beneficiary. Option C allows the member to take a lesser retirement allowance in exchange for providing a survivor with two-thirds of the lesser amount. Option C pensioners will have benefits converted from a reduced to a full retirement if the beneficiary predeceases the retiree.

Post-Retirement Benefits

The Board has adopted the provisions of Section 51 Chapter 127 of the Acts of 1999, which provide that the Retirement Board may approve an annual COLA in excess of the Consumer Price Index but not to exceed a 3% COLA on the first \$12,000 of a retirement allowance. Cost-of-living increases granted prior to July 1, 1998 are reimbursed by the Commonwealth and not reflected in this report.

Changes in Plan Provisions

There have been no changes in plan provisions since the last valuation.