

City of Worcester Retirement System

**Actuarial Valuation and Review as of
January 1, 2015**





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June 19, 2015

Retirement Board

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

Dear Board Members:

We are pleased to submit this revised Actuarial Valuation and Review as of January 1, 2015. It summarizes the actuarial data used in the valuation, establishes the funding requirements for fiscal 2016 and later years and analyzes the preceding year's experience. Section 5 has been revised to reflect the new definition of covered payroll required by the Government Accounting Standards Board.

This report was prepared in accordance with generally accepted actuarial principles and practices at the request of the Board to assist in administering the Retirement System. 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 measurements shown in this actuarial valuation may not be applicable for other purposes. Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period); and changes in plan provisions or applicable law.

An actuarial snapshot is a measurement at a specific date – it is not a prediction of a plan's future financial condition. We have not been retained to perform and did not perform an analysis of the potential range of financial measurements, except where otherwise noted.

The actuarial calculations were directed under my supervision. I am a member of the American Academy of Actuaries and I meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion herein. To the best of my knowledge, the information supplied in the actuarial valuation is complete and accurate. Further, in my 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,

Segal Consulting, a Member of The Segal Group, Inc.

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

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

Purpose

This report has been prepared by Segal Consulting to present a valuation of the City of Worcester Retirement System as of January 1, 2015. 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 Massachusetts General Law Chapter 32;
- The characteristics of covered active participants, inactive participants, and retired participants and beneficiaries as of January 1, 2015;
- The assets of the Plan as of December 31, 2014;
- 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:

1. The actuarial valuation report as of January 1, 2015 is based on financial information as of that date. Changes in the value of assets subsequent to that date are not reflected.
2. During the plan year ended 2014, the market value rate of return was 4.38%, compared to the assumed rate of return of 7.75%. Because the actuarial value of assets gradually recognizes market value fluctuations over a five-year period, the actuarial rate of return was 8.75%. The actuarial value of assets as of December 31, 2014 was \$820.7 million, or 99.4% of the market value of assets of \$825.6 million reported in the Annual Statement. As of December 31, 2013, the actuarial value of assets was 95.5% of the market value.
3. As indicated in Section 2, Subsection B of this report, the total unrecognized investment gain as of December 31, 2014 is \$4,924,937. This investment gain will be recognized in the determination of the actuarial value of assets for funding purposes in the next few years, to the extent it is not offset by recognition of investment losses derived from future experience. This implies that earning the assumed rate of investment return (net of expenses) on a market value basis will result in investment gains on the actuarial value of assets in the next few years. These gains are reflected in the projected unfunded actuarial accrued liability (UAAL) and projected appropriations shown in the funding schedule in Section 2, Chart 16.

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

4. This valuation reflects the following changes in assumptions:
 - The net investment return assumption was lowered from 7.75% to 7.625%.
 - The administrative expense assumption was increased from \$575,000 to \$600,000 for calendar year 2015.
 - The salary scale assumption was changed from 3.50% per year for 2015 and 4.50% per year thereafter to 3.50% per year for 2015 and 2016 and 4.50% thereafter.
 - The mortality assumption for disabled retirees was changed from the RP-2000 Healthy Annuitant Mortality Table projected generationally using Scale AA from 2010 with a 3-year set forward for males to the RP-2000 Healthy Annuitant Mortality Table projected generationally using Scale AA with a 3-year set forward for males.
 - The increase in liability to account for anticipated net 3(8)(c) payments was changed from \$15.3 million to \$17.0 million based on the average annual net 3(8)(c) benefits of the prior two years and the average demographics of retired participants.

Changing these assumptions resulted in a net increase in the unfunded liability of \$16,436,189 and a net increase in the employer normal cost of \$689,816.

5. The unfunded liability has increased from \$400.3 million as of January 1, 2014 to \$407.8 million as of January 1, 2015. The unfunded liability was expected to decrease to \$400.1 million. The increase of \$7.7 million from the expected unfunded liability is primarily due to the assumption changes described above, offset by an investment gain on an actuarial basis of \$7.6 million. Other sources of gains and losses are discussed in Section 2C.
6. The funding schedule included in this report reflects the increase in the unfunded liability due to the assumption changes, partially offset by the investment gain on an actuarial basis. The 2002 and 2010 ERIs are amortized in level dollar amounts for three and six years, respectively. Each year's total appropriation is calculated to be 4% greater than the prior year's payment. The System is projected to be fully funded in fiscal 2033. The total appropriation is projected to remain approximately level as a percent of payroll.
7. The funded ratio has increased from 65.81% as of January 1, 2014 to 66.80% as of January 1, 2015 on an actuarial value basis. On a market value basis, the funded ratio has decreased from 68.94% to 67.20%.
8. Section 5 shows the disclosure information required by GASB Statements No. 67 and 68 for the fiscal year ended June 30, 2015.

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

Summary of Key Valuation Results

	2015	2014
Contributions for fiscal year beginning July 1:		
Recommended for fiscal 2016 and 2015	\$42,703,837	\$41,200,578
Recommended for fiscal 2017 and 2016	44,411,990	42,703,837
Funding elements for plan year beginning January 1:		
Normal cost, including administrative expenses	\$26,909,138	\$25,552,553
Market value of assets (MVA)	825,633,173	806,990,282
Actuarial value of assets (AVA)	820,708,236	770,334,007
Actuarial accrued liability	1,228,554,779	1,170,625,635
Unfunded actuarial accrued liability	407,846,543	400,291,628
Funded ratio based on the MVA	67.20%	68.94%
Funded ratio based on the AVA	66.80%	65.81%
Demographic data for plan year beginning January 1:		
Number of retired participants and beneficiaries	2,717	2,734
Number of inactive participants entitled to a return of their employee contributions	684	647
Number of inactive participants with a vested right to a deferred or immediate benefit	87	65
Number of active participants	3,262	3,293
Total payroll*	\$168,217,887	\$163,436,722
Average payroll*	51,569	49,632

* Payroll figures are for the prior year and reflect annualized salaries for participants hired during the year. Calendar year 2014 salaries were increased by 2.0% to reflect unsettled bargaining contracts for all participants, except for certain school departments that have already settled their bargaining agreements.

SECTION 2: Valuation Summary 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: 2005 – 2014

Year Ended December 31	Active Participants	Inactive Participants	Retired Participants and Beneficiaries	Ratio of Non-Actives to Actives
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
2008	3,352	910	2,792	1.10
2009	3,262	770	2,774	1.09
2010	3,208	753	2,798	1.11
2011	3,178	759	2,776	1.11
2012	3,260	720	2,754	1.07
2013	3,293	712	2,734	1.05
2014	3,262	771	2,717	1.07

SECTION 2: Valuation Summary 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 3,262 active participants with an average age of 46.9, average years of service of 13.8 years and average payroll of \$51,569. The 3,293 active participants in the prior valuation had an average age of 47.0, average service of 13.9 years and average payroll of \$49,632.

Inactive Participants

In this year's valuation, there were 87 participants with a vested right to a deferred or immediate vested benefit and 684 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, 2014

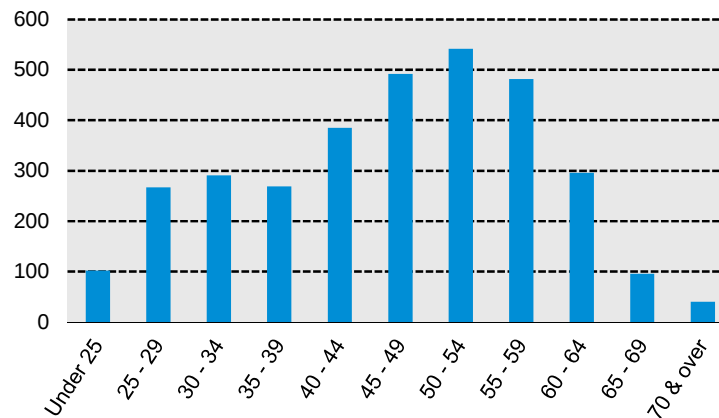
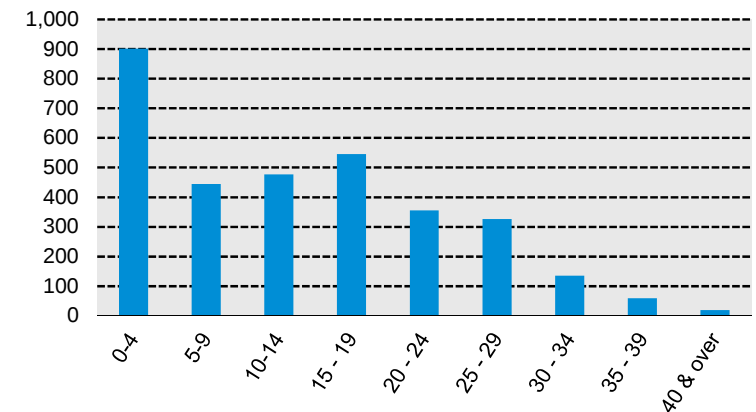


CHART 3

Distribution of Active Participants by Years of Service as of December 31, 2014



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

Retired Participants and Beneficiaries

As of December 31, 2014, 2,244 retired participants and 472 beneficiaries were receiving total monthly benefits of \$5,923,611, excluding COLAs reimbursed by the Commonwealth. For comparison, in the previous valuation, there were 2,238 retired participants and 495 beneficiaries receiving monthly benefits of \$5,675,614, excluding COLAs reimbursed by the Commonwealth. There was one retired participant in suspended status this year and in the prior valuation.

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, 2014

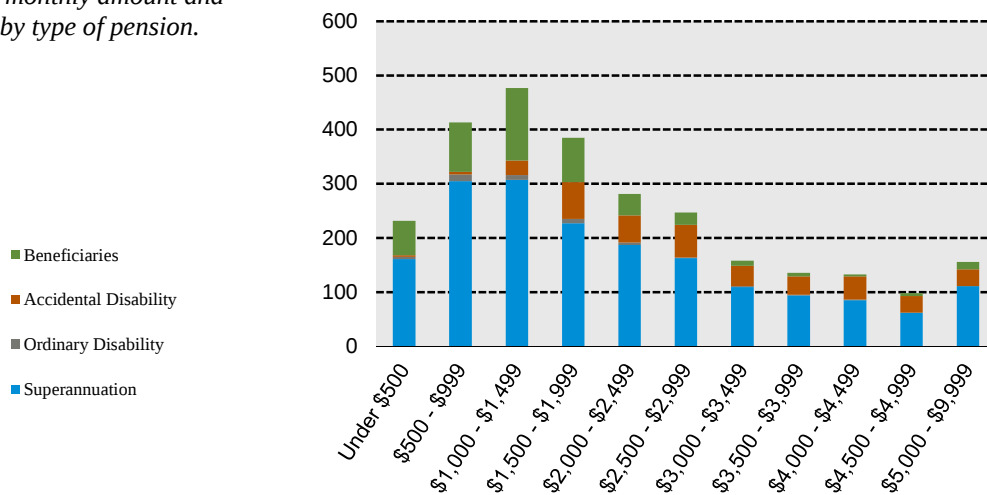
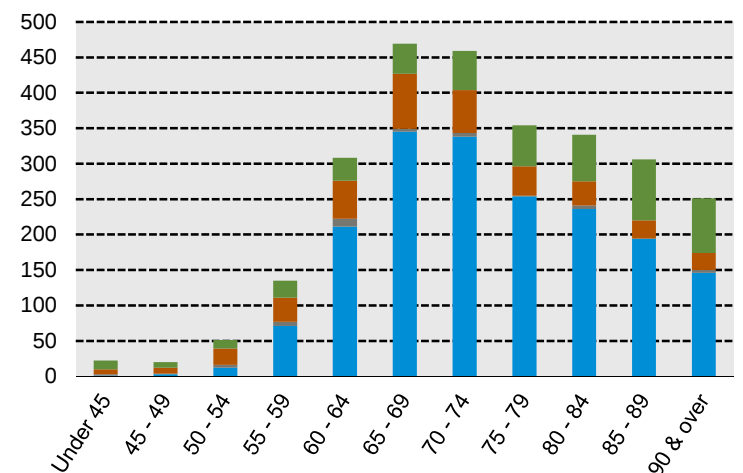


CHART 5

Distribution of Retired Participants and Beneficiaries by Type and by Age as of December 31, 2014



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

B. FINANCIAL INFORMATION

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

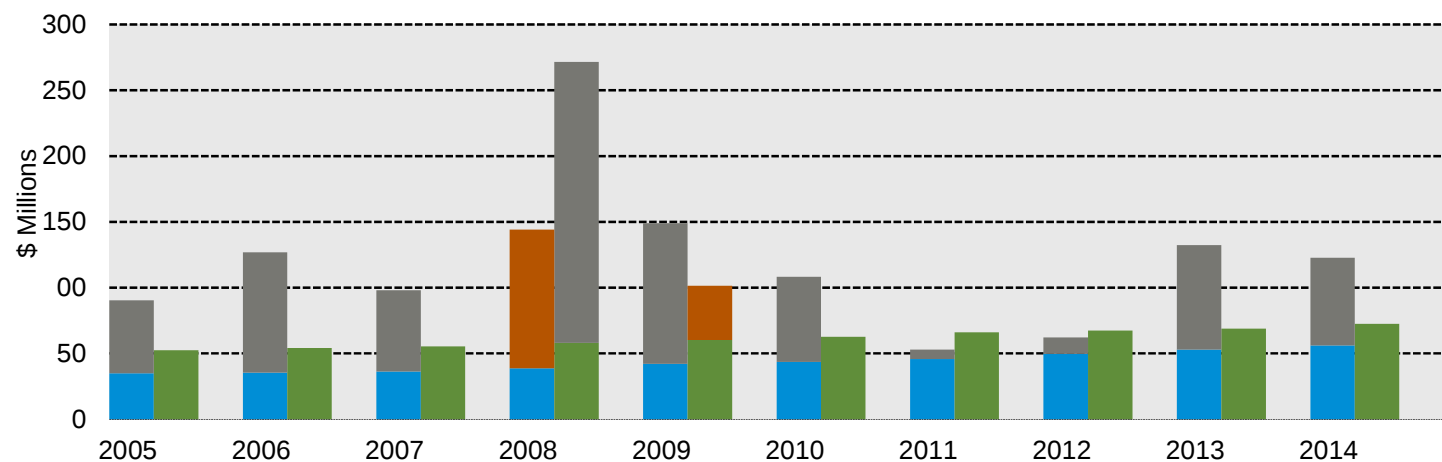
Retirement plan assets change as a result of the net impact of these income and expense components. Additional financial information, including a summary of these transactions for the valuation year, is presented in Section 3, Exhibits C and D.

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.

- Change in asset method
- Net investment income
- Benefits paid
- Net contributions

CHART 6

Comparison of Increases and Decreases in the Actuarial Value of Assets for Years Ended December 31, 2005 – 2014



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

It is desirable to have level and predictable plan costs from one year to the next. For this reason, the Board has 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.

The amount of the adjustment to recognize market value is treated as income, which may be positive or negative. Realized and unrealized gains and losses are treated equally and, therefore, the sale of assets has no immediate effect on the actuarial value.

The chart shows the determination of the actuarial value of assets as of the valuation date.

CHART 7

Determination of Actuarial Value of Assets for Year Ended December 31, 2014

1. Market value of assets, December 31, 2014				\$825,633,173
2. Calculation of deferred gains/(losses)*	Gain/(Loss) on <u>Market Value of Assets</u>	Percent <u>Remaining</u>	Deferred <u>Gain/(Loss)</u>	
(a) Year ended December 31, 2014	-\$26,959,628	80%	-\$21,567,703	
(b) Year ended December 31, 2013	37,626,006	60%	22,575,604	
(c) Year ended December 31, 2012	39,483,589	40%	15,793,436	
(d) Year ended December 31, 2011	-59,381,998	20%	-11,876,400	
(e) Year ended December 31, 2010	33,090,580	0%	<u>0</u>	
(f) Total unrecognized deferred gain/(loss)				4,924,937
3. Preliminary actuarial value: (1) - (2f)				820,708,236
4. Adjustment to be within 10% corridor				0
5. Final actuarial value of assets as of December 31, 2014: (3) + (4)				<u>\$820,708,236</u>
6. Actuarial value as a percentage of market value: (5) ÷ (1)				99.4%

* Recognized over a five-year period.

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

From 2005 through 2008, the actuarial value of assets was set equal to market value.

In 2009, the Board approved an asset valuation method that gradually adjusts to market value.

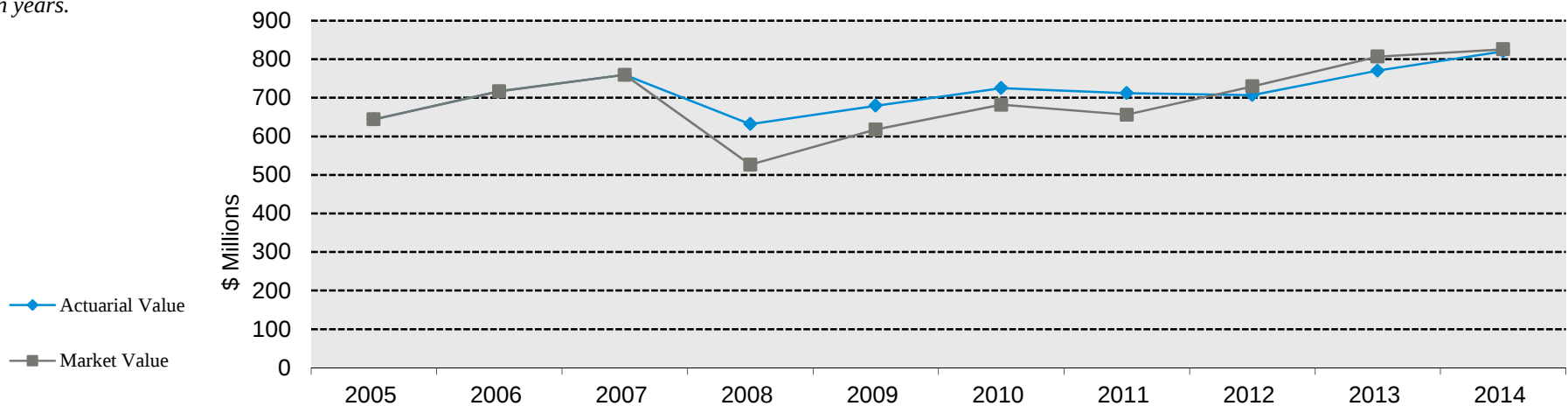
Effective with the 2010 valuation, the corridor around market value was reduced from 20% to 10%.

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 change in the actuarial value of assets versus the market value over the past ten years.

CHART 8

Actuarial Value of Assets vs. Market Value of Assets as of December 31, 2005 – 2014



SECTION 2: Valuation Summary 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 net experience gain for the year ended December 31, 2014 is \$8,734,057 as shown in Chart 9. 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 9

Actuarial Experience for Year Ended December 31, 2014

1. Net gain from investments*	\$7,612,571
2. Net loss from administrative expenses	-13,099
3. Net gain from other experience**	<u>1,134,585</u>
4. Net experience gain: (1) + (2) + (3)	\$8,734,057

* Details in Chart 10

** Details in Chart 13

SECTION 2: Valuation Summary 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 was 7.75% for the 2014 plan year. The actual rate of return on an actuarial basis for the 2014 plan year was 8.75%.

Since the return on an actuarial basis for the year was greater than the assumed return, the Worcester Retirement System experienced an actuarial gain during the year ended December 31, 2014 with regard to its investments.

This chart shows the gain/(loss) due to investment experience.

CHART 10

Actuarial Value Investment Experience for Year Ended December 31, 2014

1. Actual return	\$66,681,548
2. Average value of assets	762,180,348
3. Actual rate of return: (1) ÷ (2)	8.75%
4. Assumed rate of return	7.75%
5. Expected return: (2) x (4)	\$59,068,977
6. Actuarial gain: (1) – (5)	<u>\$7,612,571</u>

SECTION 2: Valuation Summary 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 compared to the market value investment return for the last sixteen years, including five-, ten- and sixteen-year averages.

Based upon this experience and future expectations, we have decreased the assumed rate of return from 7.75% to 7.625%.

CHART 11

Investment Return – Actuarial Value vs. Market Value: 1999 - 2014

Year Ended December 31	Actuarial Value Investment Return		Market Value Investment Return	
	Amount	Percent	Amount	Percent
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	61,690,401	8.72	61,690,401	8.72
2008	-108,338,166	-14.45	-213,653,832	-28.49
2009	65,765,691	10.56	109,307,722	21.12
2010	64,588,917	9.64	83,265,908	13.69
2011	7,371,682	1.03	-5,640,269	-0.84
2012	12,627,028	1.80	91,252,263	14.10
2013	79,399,464	11.36	93,539,099	12.97
2014	<u>66,681,548</u>	8.75	<u>34,950,210</u>	4.38
Total	\$584,903,923		\$589,829,160	
	Five-year average return	6.50%		8.63%
	Ten-year average return	5.78%		6.04%
	Sixteen-year average return	5.66%		5.95%

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

2000, 2004, 2008 and 2009 actuarial investment returns include a change in asset method.

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

Subsection B described the actuarial asset valuation method that gradually takes into account fluctuations in the market value rate of return. The effect of this is to stabilize the actuarial rate of return, which contributes to leveling pension plan costs.

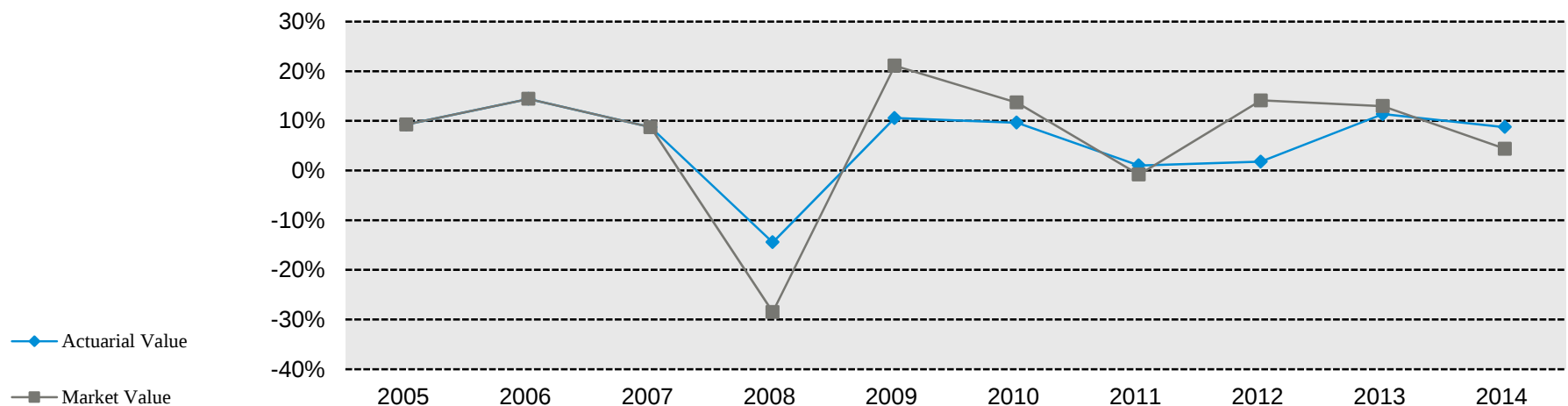
Administrative Expenses

Administrative expenses for the year ended December 31, 2014 totaled \$587,157 compared to the assumption of \$575,000, payable at the beginning of the year. This resulted in a loss of \$13,099 for the year. We have increased the assumption from \$575,000 to \$600,000 for calendar year 2015 to reflect 2014 experience adjusted for inflation.

This chart illustrates how this leveling effect has actually worked over the years 2005 - 2014.

CHART 12

Market and Actuarial Rates of Return for Years Ended December 31, 2005 - 2014



SECTION 2: Valuation Summary 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 gain from this other experience for the year ended December 31, 2014 amounted to \$1,134,585, which is 0.1% of the actuarial accrued liability.

A brief summary of the demographic gain/(loss) experience of the Worcester Retirement System for the year ended December 31, 2014 is shown in Chart 13.

This valuation reflects the following changes in assumptions:

- The net investment return assumption was lowered from 7.75% to 7.625%.

- The administrative expense assumption was increased from \$575,000 to \$600,000 for calendar year 2015.
- The salary scale assumption was changed from 3.50% per year for 2015 and 4.50% per year thereafter to 3.50% per year for 2015 and 2016 and 4.50% thereafter.
- The mortality assumption for disabled retirees was changed from the RP-2000 Healthy Annuitant Mortality Table projected generationally using Scale AA from 2010 with a 3-year set forward for males to the RP-2000 Healthy Annuitant Mortality Table projected generationally using Scale AA with a 3-year set forward for males.
- The increase in liability to account for anticipated net 3(8)(c) payments was changed from \$15.3 million to \$17.0 million based on the average annual net 3(8)(c) benefits of the prior two years and the average demographics of retired participants.

Changing these assumptions resulted in a net increase in the unfunded liability of \$16,436,189 and a net increase in the employer normal cost of \$689,816.

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

CHART 13

Experience Due to Changes in Demographics for Year Ended December 31, 2014

1. Salary increases for continuing actives less than expected	\$1,946,516
2. Fewer deaths than expected amongst retired members and beneficiaries and changes in benefit amounts provided in the data	-2,165,029
3. Miscellaneous experience gain	<u>1,353,098</u>
4. Total	\$1,134,585

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

The unfunded liability was expected to decrease from \$400.3 million to \$400.1 million as of January 1, 2015. The actuarial unfunded liability as of January 1, 2015 of \$407.8 million is \$7.7 million higher than expected as detailed in Chart 14 below.

CHART 14

Development of Unfunded Actuarial Accrued Liability and (Gain)/Loss for Year Ended December 31, 2014

1. Unfunded actuarial accrued liability at beginning of year		\$400,291,628
2. Normal cost at beginning of year		25,552,553
3. Total contributions		-56,715,269
4. Interest		
(a) For whole year on (1) + (2)	\$33,002,924	
(b) For half year on (3)	<u>-1,987,425</u>	
(c) Total interest		<u>31,015,499</u>
5. Expected unfunded actuarial accrued liability		\$400,144,411
6. Changes due to:		
(a) Investment gain	-\$7,612,571	
(b) Assumption changes	16,436,189	
(c) Net gain from other experience	<u>-1,121,486</u>	
(d) Total changes		<u>7,702,132</u>
7. Unfunded actuarial accrued liability at end of year		<u>\$407,846,543</u>

SECTION 2: Valuation Summary 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.

Because the fiscal 2016 appropriation has already been budgeted at \$42,703,837, the results of this valuation will first be reflected in the fiscal 2017 appropriation.

The funding schedule adopted last year amortized the 2002 ERI in level dollar amounts through fiscal 2018 and the 2010 ERI in level dollar amounts through fiscal 2021. The payment on the remaining unfunded liability increased 4% per year. The System was projected to be fully funded by June 30, 2031.

The funding schedule included in this report reflects the increase in the unfunded liability due to the assumption changes, partially offset by the investment gain on an actuarial basis. The 2002 and 2010 ERIs are amortized in level dollar amounts for three and six years, respectively. Each year's total appropriation is calculated to be 4% greater than the prior year's payment. The System is projected to be fully funded in fiscal 2033. The total appropriation is projected to remain approximately level as a percent of payroll.

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

CHART 15

Recommended Contribution

	Year Beginning January 1			
	2015		2014	
	Amount	% of Payroll	Amount	% of Payroll
1. Total normal cost	\$26,309,138	15.14%	\$24,977,553	14.79%
2. Administrative expenses	600,000	0.35%	575,000	0.34%
3. Expected employee contributions	<u>-16,299,684</u>	<u>-9.38%</u>	<u>-15,672,017</u>	<u>-9.28%</u>
4. Employer normal cost: (1) + (2) + (3)	\$10,609,454	6.11%	\$9,880,536	5.85%
5. Actuarial accrued liability	1,228,554,779		1,170,625,635	
6. Actuarial value of assets	<u>820,708,236</u>		<u>770,334,007</u>	
7. Unfunded actuarial accrued liability: (5) - (6)	\$407,846,543		\$400,291,628	
8. Employer normal cost projected to July 1, 2015 and 2014	10,767,420	6.11%	10,027,649	5.85%
9. Projected unfunded actuarial accrued liability	423,110,076		415,513,508	
10. Payment on projected unfunded actuarial accrued liability	31,936,417	18.11%	31,172,929	18.19%
11. Recommended contribution: (8) + (10)	<u>\$42,703,837</u>	<u>24.22%</u>	<u>\$41,200,578</u>	<u>24.04%</u>
12. Projected payroll as of July 1	\$176,346,826		\$171,370,163	

Notes: Recommended contributions are assumed to be paid at the beginning of the fiscal year.
Recommended contributions are set equal to the budgeted amounts determined with the previous valuation.

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

Chart 16 on the following page shows the recommended contributions through fiscal 2034 based on this funding schedule. In projecting the unfunded actuarial accrued liability for future fiscal years, the net deferred investment gains have been reflected in accordance with the asset valuation method approved by the Board.

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

CHART 16
Funding Schedule

(1) Fiscal Year Ended June 30	(2) Employer Normal Cost	(3) Amortization of 2002 ERI Liability	(4) Amortization of 2010 ERI Liability	(5) Amortization of Remaining Unfunded Liability	(6) Total Plan Cost: (2) + (3) + (4) + (5)	(7) Total UAAL at the Beginning of the Fiscal Year	(8) Total Plan Cost % Increase
2016	\$10,767,420	\$1,536,984	\$549,939	\$29,849,494	\$42,703,837	\$423,110,076	- -
2017	11,131,695	1,536,984	549,939	31,193,372	44,411,990	423,431,698	4.00%
2018	11,676,201	1,536,984	549,939	32,425,346	46,188,470	409,895,364	4.00%
2019	12,188,219	- -	549,939	35,297,851	48,036,009	402,967,286	4.00%
2020	12,722,586	- -	549,939	36,684,924	49,957,449	402,089,164	4.00%
2021	13,280,275	- -	549,939	38,125,533	51,955,747	392,674,440	4.00%
2022	13,862,299	- -	- -	40,171,678	54,033,977	380,991,399	4.00%
2023	14,469,716	- -	- -	41,725,620	56,195,336	366,807,225	4.00%
2024	15,103,628	- -	- -	43,339,522	58,443,150	349,869,077	4.00%
2025	15,765,189	- -	- -	45,015,687	60,780,876	329,902,434	4.00%
2026	16,455,597	- -	- -	46,756,514	63,212,111	306,609,362	4.00%
2027	17,176,108	- -	- -	48,564,487	65,740,595	279,666,628	4.00%
2028	17,928,027	- -	- -	50,442,192	68,370,219	248,723,679	4.00%
2029	18,712,720	- -	-	52,392,308	71,105,028	213,400,450	4.00%
2030	19,531,608	- -	-	54,417,621	73,949,229	173,285,013	4.00%
2031	20,386,178	- -	-	56,521,020	76,907,198	127,931,031	4.00%
2032	21,277,976	- -	-	58,705,510	79,983,486	76,855,024	4.00%
2033	22,208,619	- -	- -	19,533,415	41,742,034	19,533,415	-47.81%
2034	23,179,794	- -	- -	- -	23,179,794	- -	-44.47%

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

Item (2) reflects 3.0% growth in payroll for 2015 and 2016 and 4.0% growth in payroll thereafter, as well as a 0.15% adjustment to total normal cost to reflect the effects of mortality improvements due to the generational mortality assumption.

Projected unfunded actuarial accrued liability reflects deferred investment gains.

Fiscal 2016 contribution set at budgeted amount.

Projected normal cost does not reflect the future impact of pension reform for future hires.

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	2014	2013	
Active participants in valuation:			
Number	3,262	3,293	-0.9%
Average age	46.9	47.0	N/A
Average years of service	13.8	13.9	N/A
Total payroll*	\$168,217,887	\$163,436,722	2.9%
Average payroll*	51,569	49,632	3.9%
Inactive participants entitled to a return of their employee contributions			
	684	647	5.7%
Inactive participants with a vested right to a deferred or immediate benefit			
	87	65	33.8%
Retired participants:			
Number in pay status	1,811	1,801	0.6%
Average age	74.5	74.7	N/A
Average monthly benefit	\$2,179	\$2,060	5.8%
Number in suspended status	1	1	0.0%
Disabled participants:			
Number in pay status	433	437	-0.9%
Average age	69.4	69.2	N/A
Average monthly benefit	\$2,900	\$2,833	2.4%
Beneficiaries in pay status:			
Number in pay status	472	495	-4.6%
Average age	76.8	77.0	N/A
Average monthly benefit	\$1,530	\$1,464	4.5%

* Payroll figures are for the prior year and reflect annualized salaries for participants hired during the year. Calendar year 2014 salaries were increased by 2.0% to reflect unsettled bargaining contracts for all participants, except for certain school departments that have already settled their bargaining agreements.

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

EXHIBIT B

Participants in Active Service as of December 31, 2014 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	102	102	--	--	--	--	--	--	--	--
	\$31,340	\$31,340	--	--	--	--	--	--	--	--
25 - 29	267	241	25	1	--	--	--	--	--	--
	\$41,364	\$39,699	\$56,451	\$65,438	--	--	--	--	--	--
30 - 34	291	161	100	28	2	--	--	--	--	--
	\$50,261	\$44,030	\$57,448	\$60,465	\$49,672	--	--	--	--	--
35 - 39	269	90	69	74	35	1	--	--	--	--
	\$52,928	\$38,945	\$52,681	\$69,418	\$55,620	\$13,923	--	--	--	--
40 - 44	385	86	57	95	105	38	4	--	--	--
	\$56,634	\$36,667	\$43,445	\$64,328	\$66,542	\$75,559	\$51,270	--	--	--
45 - 49	492	93	61	77	98	119	42	2	--	--
	\$55,613	\$36,549	\$42,855	\$47,316	\$56,839	\$75,765	\$71,504	\$57,814	--	--
50 - 54	542	62	60	84	113	76	107	40	--	--
	\$53,903	\$36,230	\$39,884	\$38,387	\$43,079	\$68,683	\$77,259	\$74,928	--	--
55 - 59	482	49	38	66	103	60	91	51	22	2
	\$51,574	\$37,275	\$39,506	\$39,483	\$41,930	\$54,218	\$61,879	\$81,490	\$66,789	\$48,403
60 - 64	296	11	24	35	56	46	52	35	31	6
	\$55,399	\$33,935	\$42,741	\$48,404	\$43,181	\$50,015	\$55,810	\$76,623	\$81,642	\$78,537
65 - 69	96	4	10	14	21	10	20	5	5	7
	\$40,668	\$34,729	\$44,065	\$33,353	\$39,512	\$38,095	\$38,906	\$51,101	\$42,229	\$57,453
70 & over	40	2	1	3	12	5	10	2	1	4
	\$39,289	\$28,148	\$54,652	\$36,199	\$41,522	\$32,736	\$33,788	\$47,513	\$69,037	\$47,034
Total	3,262	901	445	477	545	355	326	135	59	19
	\$51,569	\$38,348	\$47,858	\$51,887	\$50,525	\$65,407	\$64,798	\$76,304	\$72,550	\$60,965

Note: Calendar year 2014 salaries were increased by 2.0% to reflect unsettled bargaining contracts for all participants, except for certain school departments that have already settled their bargaining agreements.

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, 2014	Year Ended December 31, 2013
Net assets at actuarial value at the beginning of the year	\$770,334,007	\$706,950,694
Contribution income:		
Employer contributions	\$41,200,578	\$38,148,683
Employee contributions	15,514,691	15,184,934
Other contributions	0	186,017
Less administrative expenses	<u>-587,157</u>	<u>-562,729</u>
Net contribution income	56,128,112	52,956,905
Net investment income	<u>66,681,548</u>	<u>79,399,464</u>
Total income available for benefits	\$122,809,660	\$132,356,369
Less benefit payments:		
Pensions	-\$60,746,291	-\$58,763,002
Net 3(8)(c) reimbursements	-2,000,919	-1,715,709
Refunds, annuities, & Option B refunds	-10,954,302	-10,460,004
State reimbursements	1,248,081	1,955,659
Workers' Compensation Settlements	<u>18,000</u>	<u>10,000</u>
Net benefit payments	-\$72,435,431	-\$68,973,056
Change in reserve for future benefits	\$50,374,229	\$63,383,313
Net assets at actuarial value at the end of the year	\$820,708,236	\$770,334,007

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

EXHIBIT D

Development of the Fund Through December 31, 2014

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
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
2008	24,947,158	14,428,460	0	-108,338,166	554,276	57,999,513	631,893,995
2009	28,505,066	14,190,598	0	65,765,691	538,983	60,306,394	679,509,973
2010	30,196,905	13,960,465	0	64,588,917	557,170	62,701,268	724,997,822
2011	32,706,347	13,602,407	0	7,371,682	569,245	65,998,653	712,110,360
2012	35,409,140	14,720,475	0	12,627,028	528,845	67,387,464	706,950,694
2013	38,148,683	15,184,934	186,017	79,399,464	562,729	68,973,056	770,334,007
2014	41,200,578	15,514,691	0	66,681,548	587,157	72,435,431	820,708,236

* Net of investment expenses. Reflects change in asset method in 2004, 2008 and 2009.

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

EXHIBIT E

Table of Amortization Bases as of July 1, 2014

Type	Annual Payment	Years Remaining	Outstanding Balance
2002 ERI	\$1,536,984	3	\$4,291,990
2010 ERI	549,939	6	2,767,554
Remaining unfunded liability	<u>29,849,494</u>	18	<u>416,050,532</u>
Total	\$31,936,417		\$423,110,076

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

Appropriation is calculated to increase 4.0% per year.

The 2002 and 2010 ERI liabilities are amortized in level payments.

Payment on remaining unfunded liability reflects adjustment to set fiscal 2016 appropriation to budgeted amount.

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

EXHIBIT F

Department Allocations of 2002 and 2010 ERI Amortization Payments

The total recommended employer contribution for fiscal 2016, excluding the ERI amortizations, is \$40,616,914. This amount will be allocated to each department based on September 30 payroll. The ERI amortizations are allocated to each department based on actual ERI participants, as shown below.

Department Allocation of ERI Amortizations

Department	Allocation of 2002 ERI Amortization	Allocation of 2010 ERI Amortization
Airport	--	\$20,688
Auditing	--	20,226
Clerk	--	5,458
DPW – Other	--	122,807
DPW - Parks	--	11,580
DPW – Sewer	\$73,616	32,607
DPW – Water	97,740	124,638
Fire	293,167	--
Health	--	6,600
Housing Authority	146,623	--
Inspectional Services	--	31,271
Library	--	51,035
Police	111,463	13,347
Public Schools	351,589	105,308
Treasury	--	4,374
Other	<u>462,786</u>	<u>--</u>
Total Fiscal Year 2016 Payment	\$1,536,984	\$549,939

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

EXHIBIT G

Definitions of Pension Terms

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) Withdrawal 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 value of all projected benefit payments for current members less the portion that will be paid by future normal costs.

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 472 beneficiaries in pay status and one retired participant in suspended status)	2,717
2. Participants active during the year ended December 31, 2014 with total accumulated contributions of \$175,646,965 and projected 2015 payroll as of January 1, 2015 of \$173,759,691	3,262
3. Inactive participants with a vested right to a return of their employee contributions as of December 31, 2014	684
4. Inactive participants with a vested right to a deferred or immediate benefit as of December 31, 2014	87

The actuarial factors as of the January 1, 2015 valuation date are as follows:

1. Total normal cost	\$26,309,138
2. Administrative expenses	600,000
3. Expected employee contributions	<u>-16,299,684</u>
4. Employer normal cost: (1) + (2) + (3)	\$10,609,454
5. Actuarial accrued liability	1,228,554,779
Retired participants and beneficiaries	\$687,917,537
Active participants	525,982,485
Inactive participants	14,654,757
6. Actuarial value of assets (\$825,633,173 at market value as reported in the draft Annual Statement)	<u>820,708,236</u>
7. Unfunded actuarial accrued liability: (5) – (6)	\$407,846,543

The determination of the recommended contribution is as follows:

1. Employer normal cost projected to July 1, 2015	\$10,767,420
2. Projected unfunded actuarial accrued liability as of July 1, 2015	423,110,076
3. Payment on projected unfunded actuarial accrued liability as of July 1, 2015	31,936,417
4. Recommended fiscal 2015 contribution: (1) + (3)	<u>\$42,703,837</u>
5. Projected payroll as of July 1, 2015	\$176,346,826
6. Total recommended contribution as a percentage of projected payroll: (4) ÷ (5)	24.22%

Notes: Recommended contribution is assumed to be paid at the beginning of the fiscal year.

Recommended contribution set equal to the budgeted amount determined with the previous valuation.

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

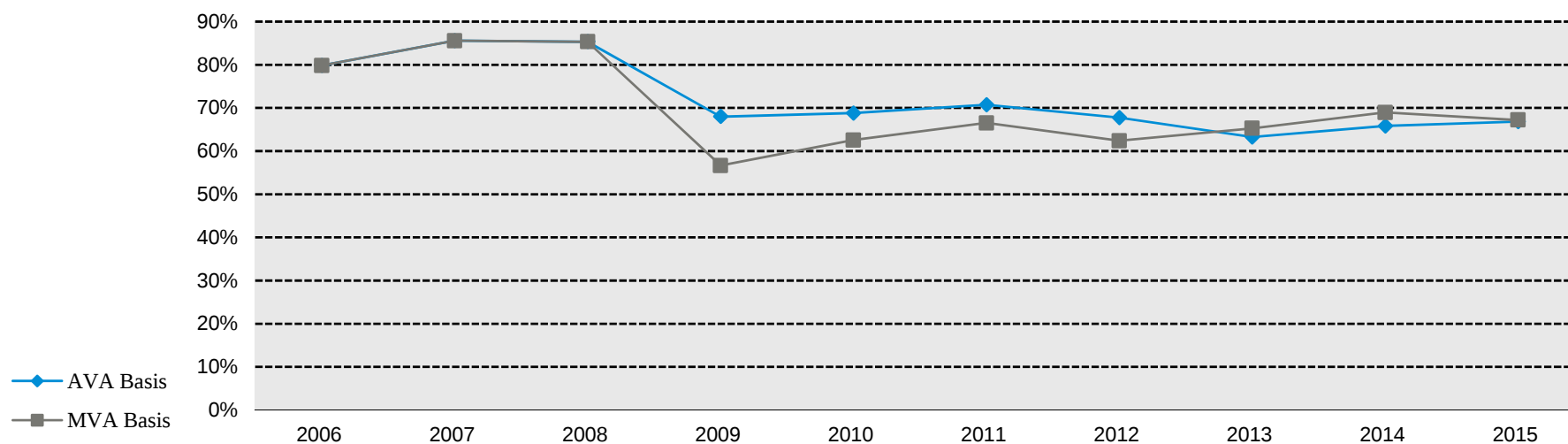
EXHIBIT II

Funded Ratio

A 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. High ratios indicate a well-funded plan with assets sufficient to cover the plan's actuarial accrued liabilities. 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.

These measurements are not necessarily appropriate for assessing the sufficiency of Plan assets to cover the estimated cost of settling the Plan's benefit obligation or the need for or the amount of future contributions.

The chart below depicts a history of the funded ratios for this plan. On a market value basis, the funded ratio has decreased from 68.94% as of January 1, 2014 to 67.20% as of January 1, 2015. On an actuarial basis, the funded ratio has increased from 65.81% as of January 1, 2014 to 66.80% as of January 1, 2015.



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

EXHIBIT II
Actuarial Assumptions and Actuarial Cost Method

Mortality Rates:

<i>Pre-retirement:</i>	RP-2000 Employee Mortality Table projected generationally using Scale AA
<i>Healthy Retiree:</i>	RP-2000 Healthy Annuitant Mortality Table projected generationally using Scale AA
<i>Disabled Retiree:</i>	RP-2000 Healthy Annuitant Mortality Table projected generationally using Scale AA set forward 3 years for males (previously, RP-2000 Healthy Annuitant Mortality Table projected generationally using Scale AA from 2010, set forward 3 years for males)
	The mortality tables reasonably reflect the projected mortality experience of the Plan as of the measurement date based on historical and current demographic data. As part of the analysis, a comparison was made between the actual number of retiree deaths and the projected number based on the prior year’s assumptions. The mortality tables were then adjusted to future years using generational projection under Scale AA to reflect future mortality improvement.

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

Termination Rates before Retirement:

Age	Groups 1 and 2 - Rate (%)			
	Mortality		Disability	Withdrawal
	Male	Female		
20	0.03	0.02	0.01	12.00
25	0.04	0.02	0.03	8.78
30	0.04	0.03	0.04	5.55
35	0.08	0.05	0.07	3.93
40	0.11	0.07	0.13	2.31
45	0.15	0.11	0.18	1.89
50	0.21	0.17	0.24	1.46
55	0.30	0.25	0.30	0.00
60	0.49	0.39	0.35	0.00

Notes: Mortality rates do not reflect generational projection.

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

Group 4 - Rate (%)				
Age	Mortality		Disability	Withdrawal
	Male	Female		
20	0.03	0.02	0.13	2.10
25	0.04	0.02	0.25	1.88
30	0.04	0.03	0.38	1.65
35	0.08	0.05	0.38	1.11
40	0.11	0.07	0.38	0.56
45	0.15	0.11	1.25	0.28
50	0.21	0.17	1.56	0.00
55	0.30	0.25	1.50	0.00
60	0.49	0.39	1.06	0.00

Notes: Mortality rates do not reflect generational projection.

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.

The termination rates and disability rates were based on historical and current demographic data, adjusted to reflect economic conditions of the area and estimated future experience and professional judgment. As part of the analysis, a comparison was made between the actual number of terminations and disability retirements and the projected number based on the prior year's assumptions.

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

Retirement Rates:

Age	Rate (%)	
	Groups 1 and 2	Group 4
50	3.0	5.0
51-54	1.0	1.0
55	2.0	16.0
56	2.0	9.0
57	3.0	9.0
58	3.0	12.0
59	3.0	11.0
60	8.0	24.0
61	7.0	14.0
62	15.0	20.0
63	11.0	13.0
64	10.0	19.0
65	36.0	100.00
66	22.0	
67	22.0	
68	22.0	
69	25.0	
70	100.0	

The retirement rates were based on historical and current demographic data, adjusted to reflect economic conditions of the area and estimated future experience and professional judgment. As part of the analysis, a comparison was made between the actual number of retirements by age and the projected number based on the prior year's assumptions.

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

Retirement Age for Inactive Vested Participants:

55 for participants hired prior to April 2, 2012. For participants hired April 2, 2012 or later, 60 for Group 1, 55 for Group 2 and 50 for Group 4

The retirement age for inactive vested participants was based on historical and current demographic data, adjusted to reflect economic conditions of the area and estimated future experience and professional judgment.

Unknown Data for Participants:

Same as those exhibited by participants with similar known characteristics.

Family Composition:

80% of participants are assumed to be married. None are assumed to have dependent children. Females are assumed to be three years younger than their spouses.

Benefit Election:

All participants are assumed to elect Option A. The benefit election reflects the fact that all benefit options are actuarially equivalent.

Net Investment Return:

7.625% (previously, 7.75%)

The net investment return assumption is a long-term estimate derived from historical data, current and recent market expectations, and professional judgment. As part of the analysis, a building block approach was used that reflects inflation expectations and anticipated risk premiums for each of the portfolio's asset classes, as well as the Plan's target asset allocation.

Salary Scale:

3.50% per year for 2015 and 2016, with an allowance for inflation of 3.00%, and 4.50% per year thereafter, with an allowance for inflation of 4.00% (previously, 3.50% per year for 2014 and 2015 with an allowance for inflation of 3.00% and 4.50% per year thereafter with an allowance for inflation of 4.00%)

The salary scale assumption is a long-term estimate derived from historical data, current and recent market expectations, and professional judgment.

Interest on Employee Contributions:

3.5%

Administrative Expenses:

\$600,000 for calendar 2015, increasing 3.0% per year for 2015 and 2016 and 4.0% per year thereafter (previously, \$575,000 for calendar 2014 increasing 3.0% per year for 2014 and 2015 and 4.0% per year thereafter.)

The administrative expense assumption is based on actual experience for 2014, adjusted for inflation.

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

2014 Salary:	2014 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. Calendar year 2014 salaries were increased by 2.0% to reflect unsettled bargaining contracts for all participants, except for certain school departments that have already settled their bargaining agreements.
Total Service:	Total creditable service reported in the data. If missing, total creditable service estimated from adjusted date of hire.
Net 3(8)(c) Liability:	Estimated liability of \$17.0 million based on the average annual net 3(8)(c) benefits of the prior two years and the average demographics of retired participants. (Previously, estimated liability of \$15.3 million based on the average annual net 3(8)(c) benefits of the prior two years and the average demographics of retired participants.)
Actuarial Value of Assets:	Market value of assets as reported in the System's Annual Statement less unrecognized return in each of the last five years. Unrecognized return is equal to the difference between the actual market value return and the expected market value return and is recognized over a five-year period, further adjusted, if necessary, to be within 10% of the market value.
Actuarial Cost Method:	Entry Age Normal Actuarial Cost Method. Entry Age is the age of the participant less Total Service as defined above. Normal Cost and Actuarial Accrued Liability are calculated on an individual basis and are allocated by salary. Normal Cost is determined using the plan of benefits applicable to each participant.

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

Changes in Assumptions:

Based on past experience and future expectations, the following actuarial assumptions were changed as of January 1, 2015:

- The net investment return assumption was lowered from 7.75% to 7.625%.
- The administrative expense assumption was increased from \$575,000 to \$600,000 for calendar year 2015.
- The salary scale assumption was changed from 3.50% per year for 2015 and 4.50% per year thereafter to 3.50% per year for 2015 and 2016 and 4.50% thereafter.
- The mortality assumption for disabled retirees was changed from the RP-2000 Healthy Annuitant Mortality Table projected generationally using Scale AA from 2010 with a 3-year set forward for males to the RP-2000 Healthy Annuitant Mortality Table projected generationally using Scale AA with a 3-year set forward for males.
- The increase in liability to account for anticipated net 3(8)(c) payments was changed from \$15.3 million to \$17.0 million based on the average annual net 3(8)(c) benefits of the prior two years and the average demographics of retired participants.

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

EXHIBIT IV

Summary of Plan Provisions

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

Plan Year: January 1 through 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.)

For employees hired prior to April 2, 2012, 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

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

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 annual rate of regular compensation received during the last three years of creditable service prior to retirement.

For employees hired on April 2, 2012 or later, the annual amount of the retirement allowance is based on the member's final five-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 tables based on the age and years of creditable service of the member at retirement:

For members with less than 30 years of creditable service:

Age Last Birthday at Date of Retirement

Percent	Group 1	Group 2	Group 4
2.50	67 or over	62 or over	57 or over
2.35	66	61	56
2.20	65	60	55
2.05	64	59	54
1.90	63	58	53
1.75	62	57	52
1.60	61	56	51
1.45	60	55	50

For members with 30 years of creditable service or greater:

Age Last Birthday at Date of Retirement

Percent	Group 1	Group 2	Group 4
2.500	67 or over	62 or over	57 or over
2.375	66	61	56
2.250	65	60	55
2.125	64	59	54
2.000	63	58	53
1.875	62	57	52
1.750	61	56	51
1.625	60	55	50

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

A member's final five-year average salary is defined as the greater of the highest consecutive five-year average annual rate of regular compensation and the average annual rate of regular compensation received during the last five years of creditable service prior to retirement.

For employees who became members after January 1, 2011, regular compensation is limited to 64% of the federal limit found in 26 U.S.C. 401(a)(17). In addition, regular compensation for members who retire after April 2, 2012 will be limited to prohibit "spiking" of a member's salary to increase the retirement benefit.

For all employees, the maximum annual amount of the retirement allowance is 80 percent of the member's final 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

Date of Hire	Contribution Rate
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 voluntarily withdraw their contributions with less than 10 ten years of credited service receive 3% interest on their contributions.

Employees in Group 1 hired on or after April 2, 2012 with 30 years of creditable service or greater will pay a base contribution rate of 6%.

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

Retirement Benefits (Superannuation)

Members of Group 1, 2 or 4 hired prior to April 2, 2012 may retire upon the attainment of age 55. For retirement at ages below 55, twenty years of creditable service is required.

Members hired prior to April 2, 2012 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).

Members of Group 1 hired April 2, 2012 or later may retire upon the attainment of age 60. Members of Group 2 or 4 hired April 2, 2012 or later may retire upon the attainment of age 55. Members of Group 4 may retire upon attainment of age 50 with ten years of creditable service.

Members hired April 2, 2012 or later who terminate before age 55 (60 for members of Group 1) with ten or more years of creditable service are eligible for a retirement allowance upon the attainment of age 55 (60 for members of Group 1) provided they have not withdrawn their accumulated deductions from the Annuity Savings Fund of the System.

Ordinary Disability Benefit

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 (age 60 for Group 1 members hired on or after April 2, 2012), 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.

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

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 \$250 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.

Upon the death of a job-connected disability retiree who retired prior to November 7, 1996 and could not elect an Option C benefit, a surviving spouse will receive an allowance of \$12,000 per year if the member dies for a reason unrelated to cause of disability.

"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.

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

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 Death Benefits:

The Board has adopted the provisions of Section 51 of 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 \$13,000 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:

As permitted by Section 63 of Chapter 139 of the Acts of 2012, the Board has increased the Section 101 annual allowance from \$9,000 to \$12,000.

SECTION 5: GASB Information for the City of Worcester Retirement System

EXHIBIT 1

Net Pension Liability

The components of the net pension liability of the City of Worcester Retirement System at December 31, 2014 were as follows:

Total pension liability	\$1,228,554,779
Plan fiduciary net position	825,633,173
System's net pension liability	402,921,606
Plan fiduciary net position as a percentage of the total pension liability	67.20%

Actuarial assumptions. The total pension liability was determined by an actuarial valuation as of December 31, 2014, using the following actuarial assumptions, applied to all periods included in the measurement:

Inflation	3.00% per year for 2015 and 2016 and 4.00% per year thereafter
Salary increases	3.50% per year for 2015 and 2016 and 4.50% per year thereafter
Investment rate of return	7.625%, net of pension plan investment expense, including inflation
Cost of Living Adjustment	3% of first \$13,000
Pre-Retirement:	RP-2000 Employee Mortality Table projected generationally using Scale AA
Healthy Retiree:	RP-2000 Healthy Annuitant Mortality Table projected generationally using Scale AA
Disabled Retiree:	RP-2000 Healthy Annuitant Mortality Table projected generationally using Scale AA, set forward three years for males

The long-term expected rate of return on pension plan investments was determined using a building-block method in which best-estimate ranges of expected future real rates of return (expected returns, net of pension plan investment expense and inflation) are developed for each major asset class. These ranges are combined to produce the long-term expected rate of return by weighting the expected future real rates of return by the target asset allocation percentage and by adding expected inflation. Best estimates of arithmetic real rates of return for each major asset class included in the pension plan's target asset allocation as of December 31, 2014 are summarized in the following table:

SECTION 5: GASB Information for the City of Worcester Retirement System

Asset Class	Long-Term Expected Real Rate of Return
Domestic equity	6.40%
International developed markets equity	7.07%
International emerging markets equity	9.26%
Core fixed income	1.53%
High-yield fixed income	4.25%
Real estate	4.30%
Commodities	3.77%
Hedge fund, GTAA, Risk parity	3.44%
Private equity	11.26%
Cash	0.96%

Discount rate sensitivity

Discount rate: The discount rate used to measure the total pension liability was 7.625%. The projection of cash flows used to determine the discount rate assumed plan member contributions will be made at the current contribution rate and that contributions will be made at rates equal to the actuarially determined contribution rates. Based on those assumptions, the pension plan's fiduciary net position was projected to be available to make all projected future benefit payments of current plan members. Therefore, the long-term expected rate of return on pension plan investments was applied to all periods of projected benefit payments to determine the total pension liability.

Sensitivity of the net pension liability to changes in the discount rate. The following presents the net pension liability, calculated using the discount rate of 7.625%, as well as what the net pension liability would be if it were calculated using a discount rate that is 1-percentage-point lower (6.625%) or 1-percentage-point higher (8.625%) than the current rate:

	1% Decrease (6.625%)	Current Discount (7.625%)	1% Increase (8.625%)
City of Worcester Retirement System's net pension liability as of December 31, 2014	\$536,129,379	\$402,921,606	\$289,475,166

SECTION 5: GASB Information for the City of Worcester Retirement System

EXHIBIT 2

Schedule of Changes in the Net Pension Liability – Last Ten Years

	Year End December 31,									
	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005
Total pension liability										
Service cost	\$24,977,553									
Interest	89,852,374									
Differences between expected and actual experience	-901,542									
Changes of assumptions	16,436,189									
Changes of benefit terms	0									
Benefit payments, including refunds of employee contributions	-72,435,430									
Net change in total pension liability	\$57,929,144									
Total pension liability - beginning	\$1,170,625,635									
Total pension liability - ending (a)	<u>\$1,228,554,779</u>									
Plan fiduciary net position										
Contributions - employer	\$41,200,578									
Contributions - employee	15,514,691									
Net investment income	34,950,209									
Benefit payments, including refunds of employee contributions	-72,435,430									
Administrative expenses	-587,157									
Net change in fiduciary net position	\$18,642,891									
Plan fiduciary net position - beginning	\$806,990,282									
Plan fiduciary net position - ending (b)	\$825,633,173									
Net pension liability – ending: (a)-(b)	\$402,921,606									
Plan's fiduciary net position as a percentage of the total pension liability	67.20%									
Covered-employee payroll	\$183,018,123									
Net pension liability as a percentage of covered-employee payroll	220.15%									

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EXHIBIT 3

Schedule of Contributions – Last Ten Years

	Year End December 31,									
	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005
Actuarially determined contribution*	\$41,200,578*									
Contributions in relation to the actuarially determined contribution	41,200,578									
Contribution deficiency (excess)	0									
Covered-employee payroll	\$183,018,123									
Contributions as a percentage of covered-employee payroll	22.51%									

(Historical information prior to implementation of GASB 67/68 is not required)

* Based on the results of the January 1, 2013 actuarial valuation (including assumptions and methods) which determined budgeted appropriation for fiscal 2015.

SECTION 5: GASB Information for the City of Worcester Retirement System

EXHIBIT 4

Pension Expense and Deferred Outflows/Inflows of Resources Related to Pensions

A. Pension expense for the year ended December 31, 2014

	Total	City of Worcester	Worcester Housing Authority
Service cost	\$24,977,553		
Interest on total pension liability	89,852,374		
Contributions – employee	-15,514,691		
Projected earnings on pension plan investments	-61,909,838		
Administrative expenses	587,157		
Recognized portion of current period plan between expected and actual experience	-150,257		
Recognized portion of current period plan between projected and actual earnings on pension plan investments	5,391,926		
Recognized portion of current year period assumption change	2,739,365		
Recognized portion of current year period plan change	0		
Recognition of deferred outflows of resources	0		
Recognition of deferred inflows of resources	0		
Pension expense for fiscal year ended June 30, 2015	<u>\$45,973,589</u>	<u>\$42,631,720</u>	<u>\$3,341,869</u>
Fiscal Year 2015 allocation percentage	100.00%	92.730893%	7.269107%

B. Deferred outflows/inflows of resources related to pensions

	City of Worcester		Worcester Housing Authority		Total	
	Deferred Outflows of Resources	Deferred Inflows of Resources	Deferred Outflows of Resources	Deferred Inflows of Resources	Deferred Outflows of Resources	Deferred Inflows of Resources
Differences between expected and actual experience	\$0	-\$696,673	\$0	-\$54,612	\$0	-\$751,285
Changes of assumptions	12,701,187	0	995,637	0	13,696,824	0
Changes of benefit terms	0	0	0	0	0	0
Net difference between projected and actual earnings on pension plan investments	<u>19,999,924</u>	<u>0</u>	<u>1,567,779</u>	<u>0</u>	<u>21,567,703</u>	<u>0</u>
Total	\$31,701,111	-\$696,673	\$2,563,416	-\$54,612	\$35,264,527	-\$751,285

SECTION 5: GASB Information for the City of Worcester Retirement System

C. Projected recognition of deferred outflows/(inflows)

Employer Name	Deferred Inflows/(Outflows) Recognized In Future Pension Expense (Year Ended June 30):					
	2016	2017	2018	2019	2020	Thereafter
City of Worcester	\$7,400,884	\$7,400,884	\$7,400,884	\$7,400,883	\$2,400,902	\$0
Worcester Housing Authority	<u>580,150</u>	<u>580,150</u>	<u>580,150</u>	<u>580,150</u>	<u>188,205</u>	<u>0</u>
Grand Totals:	\$7,981,034	\$7,981,034	\$7,981,034	\$7,981,033	\$2,589,107	0

D. Discount rate sensitivity

Discount rate: The discount rate used to measure the total pension liability was 7.625%. The projection of cash flows used to determine the discount rate assumed plan member contributions will be made at the current contribution rate and that contributions will be made at rates equal to the actuarially determined contribution rates. Based on those assumptions, the pension plan's fiduciary net position was projected to be available to make all projected future benefit payments of current plan members. Therefore, the long-term expected rate of return on pension plan investments was applied to all periods of projected benefit payments to determine the total pension liability.

Sensitivity of the net pension liability to changes in the discount rate. The following presents the net pension liability, calculated using the discount rate of 7.625%, as well as what the net pension liability would be if it were calculated using a discount rate that is 1-percentage-point lower (6.625%) or 1-percentage-point higher (8.625%) than the current rate:

	1% Decrease (6.625%)	Current Discount (7.625%)	1% Increase (8.625%)
City of Worcester's net pension liability as of December 31, 2014	\$497,157,561	\$373,632,803	\$268,432,906
Worcester Housing Authority's net pension liability as of December 31, 2014	38,971,818	29,288,803	21,042,260
City of Worcester Retirement System's net pension liability as of December 31, 2014	\$536,129,379	\$402,921,606	\$289,475,166

SECTION 5: GASB Information for the City of Worcester Retirement System

EXHIBIT 5

Schedule of Pension Amounts by Employer as of December 31, 2014

Employer Name	Net Pension Liability	Deferred Outflows of Resources					Deferred Inflows of Resources					Pension Expense		
		Differences Between Expected and Actual Experience	Net Difference Between Projected and Actual Investment Earnings on Pension Plan Investments	Changes of Assumptions	Changes in Proportion and Differences Between Employer Contributions and Proportionate Share of Contributions	Total Deferred Outflows of Resources	Differences Between Expected and Actual Experience	Net Difference Between Projected and Actual Investment Earnings on Pension Plan Investments	Changes of Assumptions	Changes in Proportion and Differences Between Employer Contributions and Proportionate Share of Contributions	Total Deferred Inflows of Resources	Proportionate Share of Plan Pension Expense	Net Amortization of Deferred Amounts from Changes in Proportion and Differences Between Employer Contributions and Proportionate Share of Contributions	Total Employer Pension Expense
City of Worcester	\$373,632,803	\$0	\$19,999,924	\$12,701,187	\$0	\$32,701,111	\$696,673	\$0	\$0	\$0	\$696,673	\$42,631,720	\$0	\$42,631,720
Worcester Housing Authority	<u>29,288,803</u>	<u>0</u>	<u>1,567,779</u>	<u>995,637</u>	<u>0</u>	<u>2,563,416</u>	<u>54,612</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>54,612</u>	<u>3,341,869</u>	<u>0</u>	<u>3,341,869</u>
Grand Totals:	\$402,921,606	\$0	\$21,567,703	\$13,696,824	\$0	\$ 35,264,527	\$751,285	\$0	\$0	\$0	\$751,285	\$45,973,589	\$0	\$45,973,589

SECTION 5: GASB Information for the City of Worcester Retirement System

EXHIBIT 6

Schedule of Contributions – Last Ten Years – Department Breakdown

	Year End December 31,									
	2014*	2013	2012	2011	2010	2009	2008	2007	2006	2005
City of Worcester										
Actuarially determined contribution	\$38,205,664									
Contributions in relation to the actuarially determined contribution	38,205,664									
Contribution deficiency (excess)	0									
Covered-employee payroll	\$170,743,797									
Contributions as a percentage of covered-employee payroll	22.38%			(Historical information prior to implementation of GASB 67/68 is not required)						
Worcester Housing Authority										
Actuarially determined contribution	\$2,994,914									
Contributions in relation to the actuarially determined contribution	2,994,914									
Contribution deficiency (excess)	0									
Covered-employee payroll	\$12,274,326									
Contributions as a percentage of covered-employee payroll	24.40%			(Historical information prior to implementation of GASB 67/68 is not required)						
Grand Total										
Actuarially determined contribution	\$41,200,578									
Contributions in relation to the actuarially determined contribution	41,200,578									
Contribution deficiency (excess)	0									
Covered-employee payroll	\$183,018,123									
Contributions as a percentage of covered-employee payroll	22.51%			(Historical information prior to implementation of GASB 67/68 is not required)						

* Based on the results of the January 1, 2013 actuarial valuation (including assumptions and methods) which determined budgeted appropriation for fiscal 2015.

SECTION 5: GASB Information for the City of Worcester Retirement System

EXHIBIT 7

Notes to Required Supplementary Information

Valuation date	Actuarial determined contribution for fiscal 2016 determined with January 1, 2015 actuarial valuation.
Actuarial cost method	Entry Age Normal Cost Method
Amortization method	Level payments on the 2002 and 2010 ERI liability; total appropriation increases 4% per year, beginning with fiscal 2017 payment.
Remaining amortization period	3 years from July 1, 2015 for the 2002 ERI liability, 6 years from July 1, 2015 for the 2010 ERI liability and 18 years from July 1, 2015 for the remaining unfunded liability.
Asset valuation method	Market value of assets less unrecognized returns in each of the last five years. Unrecognized return is equal to the difference between the actual and expected return on a market value basis, and is recognized over a five-year period, further adjusted, if necessary, to be within 10% of the market value.
Actuarial assumptions:	
Investment rate of return	7.625% (previously, 7.75%)
Discount rate	7.625% (previously, 7.75%)
Inflation rate	3.00% for 2015 and 2016, and 4.00% thereafter (previously, 3.00% for 2014 and 2015, and 4.00% thereafter)
Projected salary increases	3.50% for 2015 and 2016, and 4.50% thereafter (previously, 3.50% for 2014 and 2015, and 4.50% thereafter)
Cost of living adjustments	3.00% of first \$13,000 of retirement income
Plan membership:	
Retired participants and beneficiaries receiving benefits	2,717
Inactive participants entitled to a return of their employee contributions	684
Inactive participants with a vested right to a deferred or immediate benefit	87
Active participants	<u>3,262</u>
Total	6,750

SECTION 5: GASB Information for the City of Worcester Retirement System

Changes in Assumptions:

Effective January 1, 2014:

- The salary scale assumption was changed from 4.50% to 3.50% per year for 2014 and 2015 and 4.50% per year thereafter.
- The pre-retirement mortality assumption was changed from the RP-2000 Employee Mortality Table projected 20 years using Scale AA to the RP-2000 Employee Mortality Table projected generationally using Scale AA from 2000.
- The mortality assumption for non-disabled retirees was changed from the RP-2000 Healthy Annuitant Mortality Table projected 15 years using Scale AA to the RP-2000 Healthy Annuitant Mortality Table projected generationally using Scale AA from 2000.
- The mortality assumption for disabled retirees was changed from the RP-2000 Healthy Annuitant Mortality Table projected 5 years using Scale AA with a 3-year set forward for males to the RP-2000 Healthy Annuitant Mortality Table projected generationally using Scale AA from 2010 with a 3-year set forward for males.
- The assumed retirement age for inactive vested participants was changed from age 65 to age 55 for Group 1 and 2 members hired prior to April 2, 2012. For inactive vested participants hired April 2, 2012 or later, the assumed retirement age was lowered from age 65 to age 60 for Group 1 members, from age 65 to age 55 for Group 2 members and from age 55 to age 50 for Group 4 members.

Effective January 1, 2015:

- The net investment return assumption was lowered from 7.75% to 7.625%.
- The administrative expense assumption was increased from \$575,000 to \$600,000 for calendar year 2015.
- The salary scale assumption was changed from 3.50% per year for 2015 and 4.50% per year thereafter to 3.50% per year for 2015 and 2016 and 4.50% thereafter.
- The mortality assumption for disabled retirees was changed from the RP-2000 Healthy Annuitant Mortality Table projected generationally using Scale AA from 2010 with a 3-year set forward for males to the RP-2000 Healthy Annuitant Mortality Table projected generationally using Scale AA with a 3-year set forward for males.
- The increase in liability to account for anticipated net 3(8)(c) payments was changed from \$15.3 million to \$17.0 million based on the average annual net 3(8)(c) benefits of the prior two years and the average demographics of retired participants.

Changes in Plan Provisions:

As permitted by Section 63 of Chapter 139 of the Acts of 2012, the Board has increased the Section 101 annual allowance from \$9,000 to \$12,000.