

City of Worcester Retirement System

Actuarial Valuation and Review as of
January 1, 2016





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May 12, 2016

*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 Actuarial Valuation and Review as of January 1, 2016. It summarizes the actuarial data used in the valuation, establishes the funding requirements for fiscal 2017 and later years and analyzes the preceding year's experience.

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 City of 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 valuation 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 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, 2016. The valuation was performed to determine whether the assets and contributions are sufficient to provide the prescribed benefits and to provide certain disclosure information required by Governmental Accounting Standards Board Statements No. 67 and 68 as of December 31, 2015. 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, 2016;
- The assets of the System as of December 31, 2015;
- 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, 2016 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 2015, the market value rate of return was -1.28%, compared to the assumed rate of return of 7.625%. Because the actuarial value of assets gradually recognizes market value fluctuations over a five-year period, the actuarial rate of return was 5.65%. The actuarial value of assets as of December 31, 2015 was \$849.3 million, or 106.4% of the market value of assets of \$797.8 million reported in the Annual Statement. As of December 31, 2014, the actuarial value of assets was 99.4% of the market value.

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

3. As indicated in Section 2, Subsection B of this report, the total unrecognized investment loss as of December 31, 2015 is \$51,456,251. This investment loss 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 gains 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 losses on the actuarial value of assets in the next few years. These losses are reflected in the projected unfunded actuarial accrued liability (UAAL) and projected appropriations shown in the funding schedule in Section 2, Chart 16.
4. This valuation reflects the following changes in assumptions:
 - The net investment return assumption was lowered from 7.625% to 7.5%.
 - The salary scale assumption was changed from 3.50% per year for 2016 and 4.50% per year thereafter, including an allowance for inflation of 3.00% for 2016 and 4.00% per year thereafter to 3.50% per year for 2016 and 2017 and 4.50% thereafter, including an allowance for inflation of 2.50% for 2016 and 2017 and 3.50% thereafter.
 - The pre-retirement mortality assumption was changed from the RP-2000 Employee Mortality Table projected generationally using Scale AA from 2000 to the RP-2000 Employee Mortality Table projected generationally using Scale BB2D from 2009.
 - The post-retirement mortality assumption for non-disabled participants was changed from the RP-2000 Healthy Annuitant Mortality Table projected generationally using Scale AA from 2000 to the RP-2000 Healthy Annuitant Mortality Table projected generationally using Scale BB2D from 2009.
 - The mortality assumption for disabled participants was changed from the RP-2000 Healthy Annuitant Mortality Table set forward three years for males only projected generationally using Scale AA from 2000 to the RP-2000 Healthy Annuitant Mortality Table projected generationally with Scale BB2D from 2015.

Changing these assumptions resulted in a net increase in the unfunded liability of \$16,825,451 and a net increase in the employer normal cost of \$714,100.
5. The unfunded liability has increased from \$407.8 million as of January 1, 2015 to \$437.6 million as of January 1, 2016. The unfunded liability was expected to decrease to \$406.6 million. The increase of \$31.0 million from the expected unfunded liability is primarily due to the assumption changes described above and an investment loss on an actuarial basis of \$16.0 million. Other sources of gains and losses are discussed in Section 2C.

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

6. The funding schedule included in this report reflects the increase in the unfunded liability due to the assumption changes and the investment loss on an actuarial basis. The 2002 and 2010 ERIs are amortized in level dollar amounts for two and five years, respectively. The fiscal 2017 total appropriation has been set equal to \$44,411,990 as determined with the prior valuation. The fiscal 2018 total appropriation is calculated to be 4% greater than the fiscal 2017 payment. For fiscal 2019 and later years, each year's total appropriation is calculated to be 5.85% greater than the prior year's payment. The System is projected to be fully funded in fiscal 2033. Because the total appropriation will increase faster than projected payroll, the total appropriation is expected to increase as a percent of payroll.
7. The funded ratio has decreased from 66.80% as of January 1, 2015 to 65.99% as of January 1, 2016 on an actuarial value basis. On a market value basis, the funded ratio has decreased from 67.20% to 62.00%.
8. Section 5 shows the disclosure information required by Governmental Standards Accounting Board (GASB) Statements No. 67 and 68.
 - It is important to note that the new GASB rules only redefine pension liability and expense for financial reporting purposes, and do not apply to contribution amounts for pension funding purposes. Employers and plans can still develop and adopt funding policies under current practices.
 - The Net Pension Liability (NPL) is equal to the difference between the Total Pension Liability (TPL) and the Plan's Fiduciary Net Position. The Plan's Fiduciary Net Position is equal to the market value of assets and therefore, the NPL measure is very similar to an Unfunded Actuarial Accrued Liability (UAAL) on a market value basis. The NPL increased from \$402.9 million as of December 31, 2014 to \$489.1 million as of December 31, 2015 and the Plan's Fiduciary Net Position as a percent of the TPL decreased from 67.20% to 62.00%.
 - The NPL was measured as of December 31, 2015 and 2014 and determined based upon the results of the actuarial valuations as of January 1, 2016 and January 1, 2015 respectively.
 - The discount rate used to determine the TPL and NPL was 7.50% as of December 31, 2015 and 7.625% as of December 31, 2014.

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

Summary of Key Valuation Results

	2016	2015
Contributions for fiscal year beginning July 1:		
Recommended for fiscal 2017 and 2016	\$44,411,990	\$42,703,837
Recommended for fiscal 2018 and 2017	46,188,470	44,411,990
Funding elements for plan year beginning January 1:		
Total normal cost, including administrative expenses	\$27,755,573	\$26,909,138
Market value of assets (MVA)	797,830,070	825,633,173
Actuarial value of assets (AVA)	849,286,321	820,708,236
Actuarial accrued liability	1,286,899,596	1,228,554,779
Unfunded actuarial accrued liability	437,613,275	407,846,543
Funded ratio based on the MVA	62.00%	67.20%
Funded ratio based on the AVA	65.99%	66.80%
Demographic data for plan year beginning January 1:		
Number of retired participants and beneficiaries	2,722	2,717
Number of inactive participants entitled to a return of their employee contributions	714	684
Number of inactive participants with a vested right to a deferred or immediate benefit	73	87
Number of active participants	3,275	3,262
Total payroll*	\$170,322,286	\$168,217,887
Average payroll*	52,007	51,569

* Payroll figures are for the prior year and reflect annualized salaries for participants hired during the year. Calendar year 2015 salaries were reduced by 2.0% to reflect retroactive payments that were included in the salary data for all participants, except for firefighters and members of certain school departments that settled their bargaining agreements prior to 2015. Calendar year 2015 salaries for firefighters were increased by 4.0% to reflect unsettled bargaining contracts. Salaries reported were adjusted to reflect the inclusion of a 53rd pay period for members of departments paid on a weekly basis. 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 1: Valuation Summary for the City of Worcester Retirement System

Important Information About Actuarial Valuations

An actuarial valuation is a budgeting tool with respect to the financing of future projected obligations of a pension plan. It is an estimated forecast – the actual long-term cost of the plan will be determined by the actual benefits and expenses paid and the actual investment experience of the plan.

In order to prepare a valuation, Segal Consulting (“Segal”) relies on a number of input items. These include:

- **Plan of benefits** Plan provisions define the rules that will be used to determine benefit payments, and those rules, or the interpretation of them, may change over time. Even where they appear precise, outside factors may change how they operate. It is important to keep Segal informed with respect to plan provisions and administrative procedures, and to review the plan summary included in our report to confirm that Segal has correctly interpreted the plan of benefits.
- **Participant data** An actuarial valuation for a plan is based on data provided to the actuary by the City of Worcester Retirement System. Segal does not audit such data for completeness or accuracy, other than reviewing it for obvious inconsistencies compared to prior data and other information that appears unreasonable. It is important for Segal to receive the best possible data and to be informed about any known incomplete or inaccurate data.
- **Assets** The valuation is based on the market value of assets as of the valuation date, as provided by the City of Worcester Retirement System and uses an “actuarial value of assets” that differs from market value to gradually reflect year-to-year changes in the market value of assets in determining the contribution requirements.
- **Actuarial assumptions** In preparing an actuarial valuation, Segal projects the benefits to be paid to existing plan participants for the rest of their lives and the lives of their beneficiaries. This projection requires actuarial assumptions as to the probability of death, disability, withdrawal, and retirement of each participant for each year. In addition, the benefits projected to be paid for each of those events in each future year reflect actuarial assumptions as to salary increases and cost-of-living adjustments. The projected benefits are then discounted to a present value, based on the assumed rate of return that is expected to be achieved on the plan’s assets. There is a reasonable range for each assumption used in the projection and the results may vary materially based on which assumptions are selected. It is important for any user of an actuarial valuation to understand this concept. Actuarial assumptions are periodically reviewed to ensure that future valuations reflect emerging plan experience. While future changes in actuarial assumptions may have a significant impact on the reported results, that does not mean that the previous assumptions were unreasonable.

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

The user of Segal's actuarial valuation (or other actuarial calculations) should keep the following in mind:

- The actuarial valuation is prepared at the request of the City of Worcester Retirement System. Segal is not responsible for the use or misuse of its report, particularly by any other party.
- An actuarial valuation is a measurement of the plan's assets and liabilities at a specific date. Accordingly, except where otherwise noted, Segal did not perform an analysis of the potential range of future financial measures. The actual long-term cost of the plan will be determined by the actual benefits and expenses paid and the actual investment experience of the plan.
- Actuarial results in this report are not rounded, but that does not imply precision.
- If the City of Worcester Retirement System is aware of any event or trend that was not considered in this valuation that may materially change the results of the valuation, Segal should be advised, so that we can evaluate it.
- Segal does not provide investment, legal, accounting, or tax advice. Segal's valuation is based on our understanding of applicable guidance in these areas and of the plan's provisions, but they may be subject to alternative interpretations. The City of Worcester Retirement System should look to their other advisors for expertise in these areas.

As Segal Consulting has no discretionary authority with respect to the management or assets of the Plan, it is not a fiduciary in its capacity as actuaries and consultants with respect to the Plan.

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: 2006 – 2015

Year Ended December 31	Active Participants	Inactive Participants	Retired Participants and Beneficiaries	Ratio of Non-Actives to Actives
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
2015	3,275	787	2,722	1.07

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 3,275 active participants with an average age of 46.9, average years of service of 13.6 years and average payroll of \$52,007. The 3,262 active participants in the prior valuation had an average age of 46.9, average service of 13.8 years and average payroll of \$51,569.

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

Inactive Participants

In this year's valuation, there were 73 participants with a vested right to a deferred or immediate vested benefit and 714 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, 2015

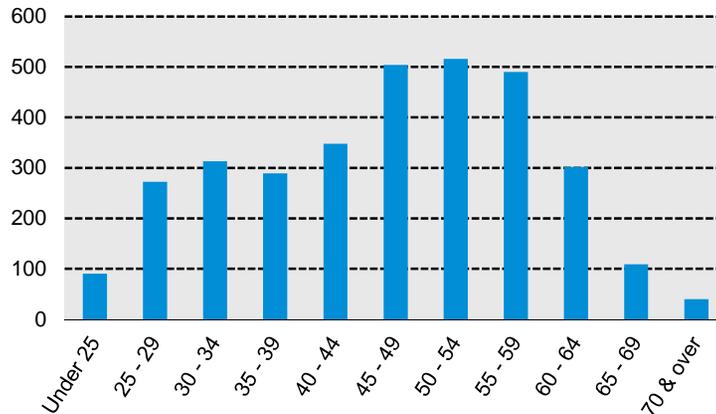
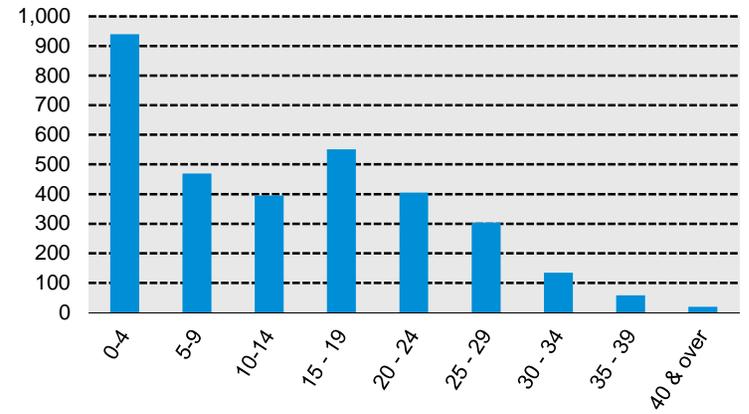


CHART 3
Distribution of Active Participants by Years of Service as of December 31, 2015



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

Retired Participants and Beneficiaries

As of December 31, 2015, 2,258 retired participants and 463 beneficiaries were receiving total monthly benefits of \$6,246,668, excluding COLAs reimbursed by the Commonwealth. For comparison, in the previous valuation, there were 2,244 retired participants and 472 beneficiaries receiving monthly benefits of \$5,923,611, 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.

- Beneficiaries
- Accidental Disability
- Ordinary Disability
- Superannuation

CHART 4
Distribution of Retired Participants and Beneficiaries by Type and by Monthly Amount as of December 31, 2015

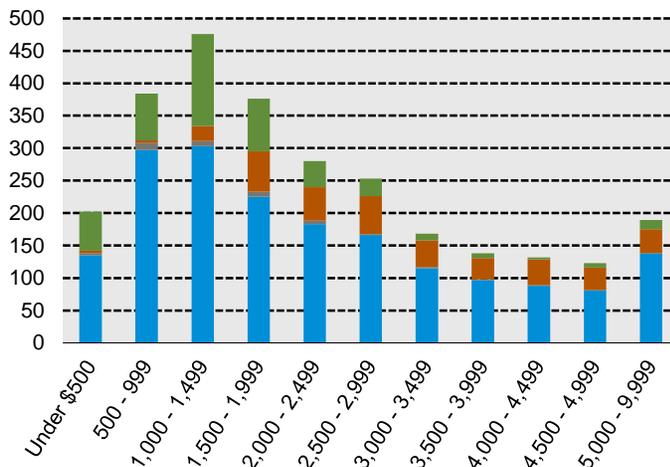
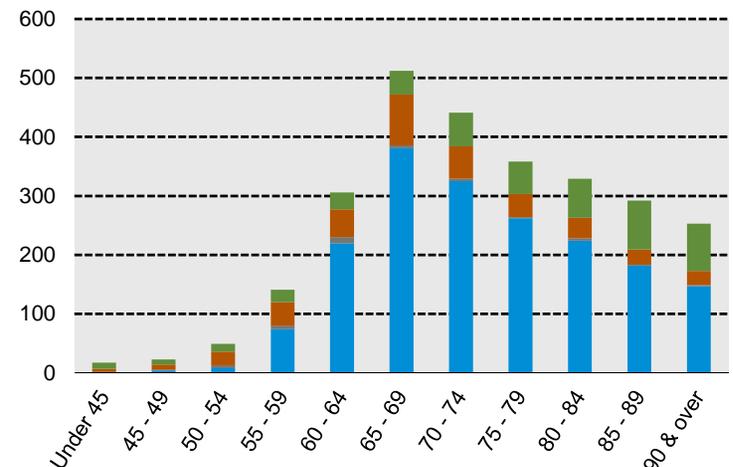


CHART 5
Distribution of Retired Participants and Beneficiaries by Type and by Age as of December 31, 2015



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

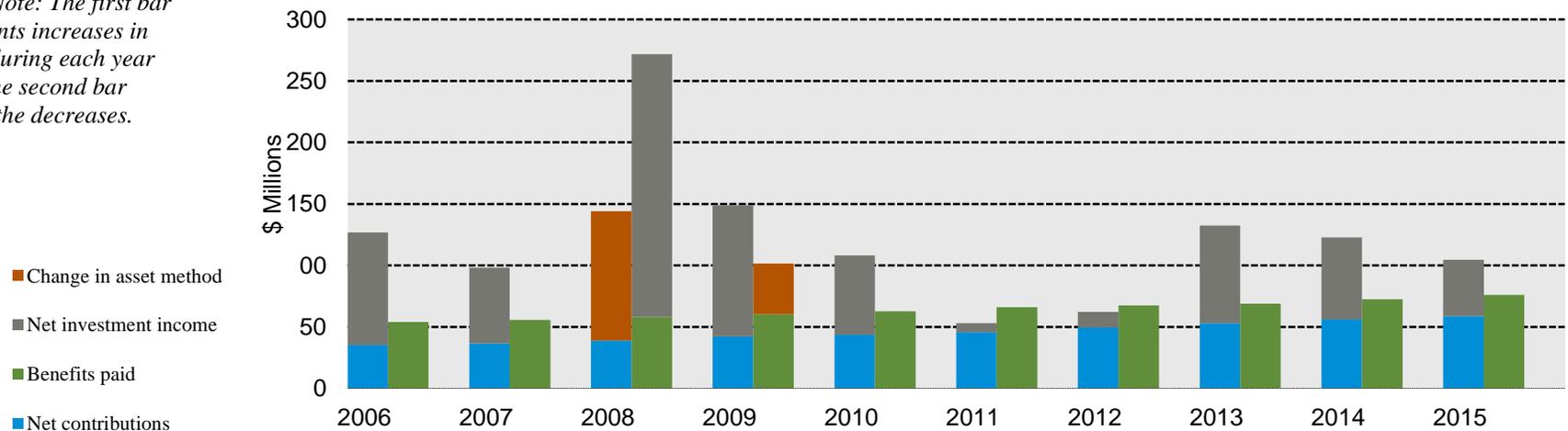
B. FINANCIAL INFORMATION

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.

CHART 6
Comparison of Increases and Decreases in the Actuarial Value of Assets for Years Ended December 31, 2006 – 2015



SECTION 2: Valuation Results 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, 2015

1. Market value of assets, December 31, 2015				\$797,830,070
2. Calculation of deferred gains/(losses)*	<u>Market Value of Assets</u>	<u>Percent Remaining</u>	<u>Deferred Gain/(Loss)</u>	
(a) Year ended December 31, 2015	-\$72,784,493	80%	-\$58,227,595	
(b) Year ended December 31, 2014	-26,959,628	60%	-16,175,776	
(c) Year ended December 31, 2013	37,626,006	40%	15,050,402	
(d) Year ended December 31, 2012	39,483,589	20%	7,896,718	
(e) Year ended December 31, 2011	-59,381,998	0%	<u>0</u>	
(f) Total unrecognized deferred gain/(loss)				-51,456,251
3. Preliminary actuarial value: (1) - (2f)				849,286,321
4. Adjustment to be within 10% corridor				0
5. Final actuarial value of assets as of December 31, 2015: (3) + (4)				<u>\$849,286,321</u>
6. Actuarial value as a percentage of market value: (5) ÷ (1)				106.4%

* Recognized over a five-year period.

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

Prior to the 2009 valuation, the actuarial value of assets was set equal to market value.

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

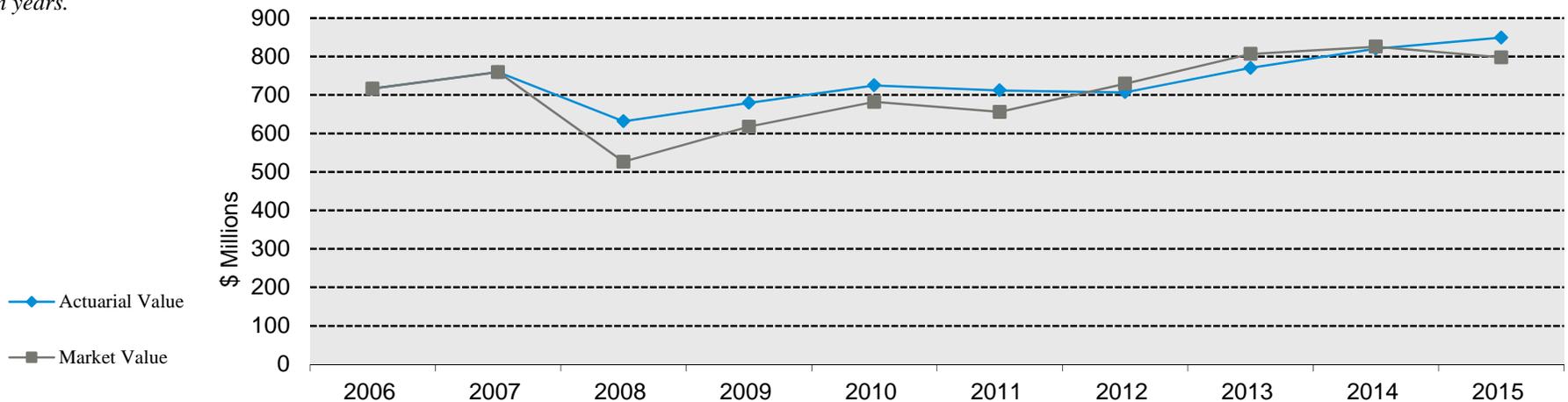
Effective with the 2010 valuation, the corridor around market value was reduced from 20% to 10%.

Both the actuarial value and market value of assets are representations of the City of Worcester Retirement System's financial status. As investment gains and losses are gradually taken into account, the actuarial value of assets tracks the market value of assets. The actuarial asset value is significant because the City of 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, 2006 – 2015



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 net experience loss is \$14,141,708. 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, 2015

1. Net loss from investments*	-\$16,027,779
2. Net gain from administrative expenses	29,336
3. Net gain from other experience**	<u>1,856,735</u>
4. Net experience loss: (1) + (2) + (3)	-\$14,141,708

* Details in Chart 10

** Details in Chart 13

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 City of Worcester Retirement System's investment policy. For valuation purposes, the assumed rate of return on the actuarial value of assets was 7.625% for the 2015 plan year. The actual rate of return on an actuarial basis for the 2015 plan year was 5.65%.

Since the actual return for the year was less than the assumed return, the City of Worcester Retirement System experienced an actuarial loss during the year ended December 31, 2015 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, 2015

1. Actual return	\$45,891,163
2. Average value of assets	812,051,697
3. Actual rate of return: (1) ÷ (2)	5.65%
4. Assumed rate of return	7.625%
5. Expected return: (2) x (4)	\$61,918,942
6. Actuarial loss: (1) – (5)	<u>-\$16,027,779</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 compared to the market value investment return for the last seventeen years, including five, ten and seventeen-year averages.

Based upon this experience and future expectations, we have decreased the assumed rate of return from 7.625% to 7.50%.

CHART 11

Investment Return – Actuarial Value vs. Market Value: 1999 - 2015

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	66,681,548	8.75	34,950,210	4.38
2015	<u>45,891,163</u>	5.65	<u>-10,490,025</u>	-1.28
Total	\$630,795,086		\$579,338,835	
	Five-year average return	5.74%		5.57%
	Ten-year average return	5.47%		4.89%
	Seventeen-year average return	5.66%		5.40%

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 Results 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.

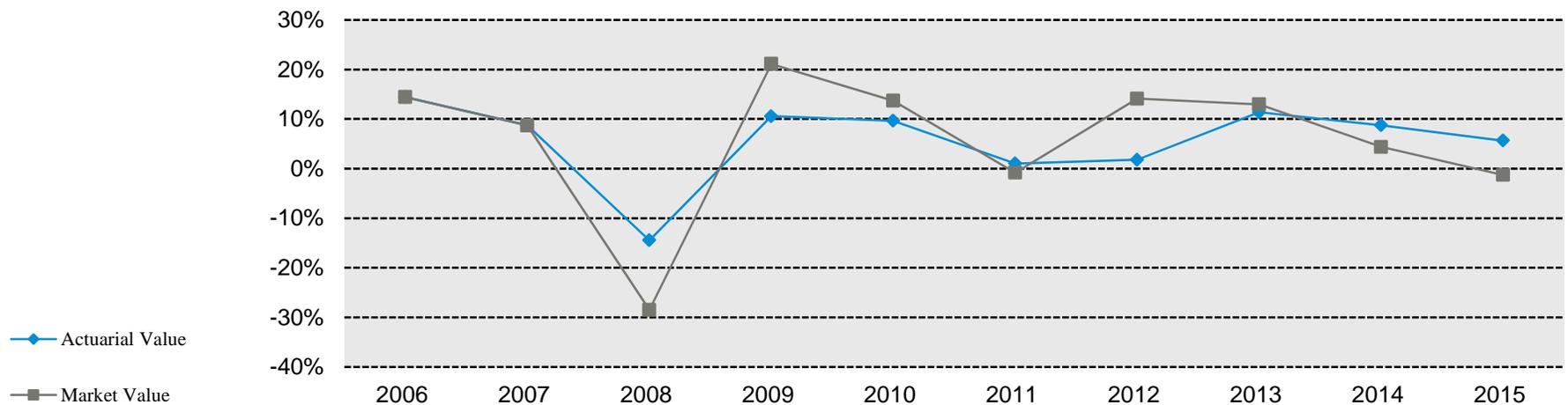
Administrative Expenses

Administrative expenses for the year ended December 31, 2015 totaled \$572,743 compared to the assumption of \$600,000, payable at the beginning of the year. This resulted in a gain of \$29,336 for the year. We have maintained the assumption of \$600,000 for the current year.

This chart illustrates how this leveling effect has actually worked over the years 2006 - 2015.

CHART 12

Market and Actuarial Rates of Return for Years Ended December 31, 2006 - 2015



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 gain from this other experience for the year ended December 31, 2015 amounted to \$1,856,735, which is 0.1% of the actuarial accrued liability.

A brief summary of the demographic gain/(loss) experience of the City of Worcester Retirement System for the year ended December 31, 2015 is shown in the chart below.

This valuation reflects the following changes in assumptions:

- The net investment return assumption was lowered from 7.625% to 7.5%.
- The salary scale assumption was changed from 3.50% per year for 2015 and 2016 and 4.50% per year thereafter to 3.50% per year for 2016 and 2017 and 4.50% thereafter.
- The pre-retirement mortality assumption was changed from the RP-2000 Employee Mortality Table projected generationally using Scale AA from 2000 to the RP-2000 Employee Mortality Table projected generationally using Scale BB2D from 2009.
- The post-retirement mortality assumption for non-disabled participants was changed from the RP-2000 Healthy Annuitant Mortality Table projected generationally using Scale AA from 2000 to the RP-2000 Healthy Annuitant Mortality Table projected generationally using Scale BB2D from 2009.

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, 2015

1. Salary increases less than expected for continuing actives	\$4,953,092
2. Retirements at younger ages than projected by the assumption	-4,561,333
3. Fewer disability pensions awarded than expected	3,190,824
4. Miscellaneous experience loss, partially due to mortality experience	<u>-1,725,848</u>
5. Total	\$1,856,735

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

- The mortality assumption for disabled participants was changed from the RP-2000 Healthy Annuitant Mortality Table set forward three years for males only projected generationally using Scale AA from 2000 to the RP-2000 Healthy Annuitant Mortality Table projected generationally with Scale BB2D from 2015.

The unfunded liability was expected to decrease from \$407.8 million to \$406.6 million as of January 1, 2016. The actuarial unfunded liability as of January 1, 2016 of \$437.6 million is \$31.0 million higher than expected as detailed in Chart 14 below.

Changing these assumptions resulted in a net increase in the unfunded liability of \$16,825,451 and a net increase in the employer normal cost of \$714,100.

CHART 14

Development of Unfunded Actuarial Accrued Liability and (Gain)/Loss for Year Ended December 31, 2015

1. Unfunded actuarial accrued liability at beginning of year		\$407,846,543
2. Normal cost at beginning of year		26,909,138
3. Total contributions		-59,217,609
4. Interest		
(a) For whole year on (1) + (2)	\$33,150,121	
(b) For half year on (3)	<u>-2,042,077</u>	
(c) Total interest		<u>31,108,044</u>
5. Expected unfunded actuarial accrued liability		\$406,646,116
6. Changes due to:		
(a) Investment loss	\$16,027,779	
(b) Assumption changes	16,825,451	
(c) Net gain from other experience	<u>-1,886,071</u>	
(d) Total changes		<u>30,967,159</u>
7. Unfunded actuarial accrued liability at end of year		<u>\$437,613,275</u>

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.

Because the fiscal 2017 appropriation has already been budgeted at \$44,411,990, the results of this valuation will first be reflected in the fiscal 2018 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. Each year's appropriation was calculated to be 4% greater than the prior year's payment. The System was projected to be fully funded by June 30, 2033.

The funding schedule included in this report reflects the increase in the unfunded liability due to the assumption changes and the investment loss on an actuarial basis. The 2002 and 2010 ERIs are amortized in level dollar amounts for two and five years, respectively. The fiscal 2017 total appropriation has been set equal to \$44,411,990 as determined with the prior valuation. The fiscal 2018 total appropriation is calculated to be 4% greater than the fiscal 2017 payment. For fiscal 2019 and later years, each year's total appropriation is calculated to be 5.85% greater than the prior year's payment. The System is projected to be fully funded in fiscal 2033. Because the total appropriation will increase faster than projected payroll, the total appropriation is expected to increase 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			
	2016	% of Payroll	2015	% of Payroll
1. Total normal cost	\$27,155,573	15.44%	\$26,309,138	15.14%
2. Administrative expenses	600,000	0.34%	600,000	0.35%
3. Expected employee contributions	<u>-16,628,957</u>	<u>-9.45%</u>	<u>-16,299,684</u>	<u>-9.38%</u>
4. Employer normal cost: (1) + (2) + (3)	\$11,126,616	6.33%	\$10,609,454	6.11%
5. Actuarial accrued liability	1,286,899,596		1,228,554,779	
6. Actuarial value of assets	<u>849,286,321</u>		<u>820,708,236</u>	
7. Unfunded actuarial accrued liability: (5) - (6)	\$437,613,275		\$407,846,543	
8. Employer normal cost projected to July 1, 2016 and 2015	11,264,840	6.33%	10,767,420	6.11%
9. Projected unfunded actuarial accrued liability	453,727,101		423,110,076	
10. Payment on projected unfunded actuarial accrued liability	33,147,150	18.61%	31,936,417	18.11%
11. Total recommended contribution: (8) + (10)	<u>\$44,411,990</u>	<u>24.94%</u>	<u>\$42,703,837</u>	<u>24.22%</u>
12. Projected payroll as of July 1	\$178,095,463		\$176,346,826	

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 Results 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 losses have been reflected in accordance with the asset valuation method approved by the Board.

SECTION 2: Valuation Results 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
2017	\$11,264,840	\$1,535,231	\$548,435	\$31,063,484	\$44,411,990	\$453,727,101	--
2018	11,588,731	1,535,231	548,435	32,516,073	46,188,470	461,760,827	4.00%
2019	11,979,856	--	548,435	36,362,205	48,890,496	476,697,993	5.85%
2020	12,444,349	--	548,435	38,757,806	51,750,590	497,072,482	5.85%
2021	12,926,750	--	548,435	41,302,814	54,777,999	509,293,403	5.85%
2022	13,427,748	--	--	44,554,764	57,982,512	502,500,317	5.85%
2023	13,948,056	--	--	47,426,433	61,374,489	492,291,469	5.85%
2024	14,488,414	--	--	50,476,483	64,964,897	478,229,914	5.85%
2025	15,049,592	--	--	53,715,751	68,765,343	459,834,939	5.85%
2026	15,632,389	--	--	57,155,727	72,788,116	436,578,127	5.85%
2027	16,237,632	--	--	60,808,588	77,046,220	407,879,080	5.85%
2028	16,866,183	--	--	64,687,241	81,553,424	373,100,779	5.85%
2029	17,518,935	--	--	68,805,365	86,324,300	331,544,553	5.85%
2030	18,196,816	--	--	73,177,455	91,374,271	282,444,628	5.85%
2031	18,900,788	--	--	77,818,878	96,719,666	224,962,211	5.85%
2032	19,631,850	--	--	82,745,916	102,377,766	158,179,083	5.85%
2033	20,391,042	--	--	81,090,654	101,481,696	81,090,654	-0.88%
2034	21,179,441	--	--	--	21,179,441	--	-79.13%

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

Item (2) reflects 2.5% growth in payroll for 2016 and 2017 and 3.5% 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 losses. Recognizing deferred investment losses means the System is anticipating investment losses on an actuarial basis.

Fiscal 2017 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

Category	Year Ended December 31		Change From Prior Year
	2015	2014	
Active participants in valuation:			
Number	3,275	3,262	0.4%
Average age	46.9	46.9	N/A
Average years of service	13.6	13.8	N/A
Total payroll*	\$170,322,286	\$168,217,887	1.3%
Average payroll*	52,007	51,569	0.8%
Member contributions	178,503,801	175,656,965	1.6%
Total active vested participants	2,071	2,104	-1.6%
Inactive participants entitled to a return of their employee contributions	714	684	4.4%
Inactive participants with a vested right to a deferred or immediate benefit	73	87	-16.1%
Retired participants:			
Number in pay status	1,828	1,811	0.9%
Average age	74.2	74.5	N/A
Average monthly benefit	\$2,310	\$2,179	6.0%
Number in suspended status	1	1	0.0%
Disabled participants:			
Number in pay status	430	433	-0.7%
Average age	69.4	69.4	N/A
Average monthly benefit	\$2,997	\$2,900	3.3%
Beneficiaries in pay status:			
Number in pay status	463	472	-1.9%
Average age	77.0	76.8	N/A
Average monthly benefit	\$1,587	\$1,530	3.7%

* Payroll figures are for the prior year and reflect annualized salaries for participants hired during the year. Calendar year 2015 salaries were reduced by 2.0% to reflect retroactive payments that were included in the salary data for all participants, except for firefighters and members of certain school departments that settled their bargaining agreements prior to 2015. Calendar year 2015 salaries for firefighters were increased by 4.0% to reflect unsettled bargaining contracts. Salaries reported were adjusted to reflect the inclusion of a 53rd pay period for members of departments paid on a weekly basis. 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, 2015
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	91	91	--	--	--	--	--	--	--	--
	\$30,922	\$30,922	--	--	--	--	--	--	--	--
25 - 29	273	243	30	--	--	--	--	--	--	--
	\$41,251	\$39,185	\$57,986	--	--	--	--	--	--	--
30 - 34	313	170	115	25	3	--	--	--	--	--
	\$50,670	\$42,032	\$61,611	\$59,814	\$44,550	--	--	--	--	--
35 - 39	289	100	81	68	38	2	--	--	--	--
	\$52,701	\$37,477	\$55,750	\$69,932	\$56,563	\$31,229	--	--	--	--
40 - 44	348	90	51	72	105	26	4	--	--	--
	\$57,759	\$38,421	\$41,354	\$70,721	\$68,556	\$76,012	\$66,644	--	--	--
45 - 49	504	111	60	57	106	125	42	3	--	--
	\$56,019	\$34,860	\$45,212	\$53,569	\$59,970	\$74,548	\$65,948	\$51,020	--	--
50 - 54	516	61	51	72	102	98	95	36	1	--
	\$55,900	\$38,268	\$41,136	\$40,655	\$44,316	\$67,875	\$77,505	\$80,463	\$53,475	--
55 - 59	490	52	45	53	102	78	88	54	16	2
	\$51,454	\$36,078	\$38,316	\$38,749	\$42,559	\$55,149	\$66,072	\$72,795	\$67,418	\$46,038
60 - 64	302	17	23	27	62	55	48	30	32	8
	\$53,857	\$38,151	\$42,325	\$45,186	\$43,232	\$49,614	\$56,988	\$67,459	\$84,591	\$68,435
65 - 69	109	4	12	18	22	15	19	6	7	6
	\$45,413	\$42,147	\$41,317	\$50,258	\$40,365	\$40,401	\$46,114	\$49,524	\$52,597	\$57,571
70 & over	40	1	1	3	11	6	8	5	2	3
	\$38,763	\$24,446	\$55,637	\$36,845	\$36,517	\$41,612	\$30,796	\$36,965	\$64,644	\$49,356
Total	3,275	940	469	395	551	405	304	134	58	19
	\$52,007	\$37,881	\$50,127	\$54,714	\$52,032	\$63,939	\$66,025	\$70,794	\$74,768	\$59,634

Note: Payroll figures are for the prior year and reflect annualized salaries for participants hired during the year. Calendar year 2015 salaries were reduced by 2.0% to reflect retroactive payments that were included in the salary data for all participants, except for firefighters and members of certain school departments that settled their bargaining agreements prior to 2015. Calendar year 2015 salaries for firefighters were increased by 4.0% to reflect unsettled bargaining contracts. Salaries reported were adjusted to reflect the inclusion of a 53rd pay period for members of departments paid on a weekly basis.

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, 2015	Year Ended December 31, 2014
Net assets at actuarial value at the beginning of the year	\$820,708,236	\$770,334,007
Contribution income:		
Employer contributions	\$42,703,837	\$41,200,578
Employee contributions	16,513,772	15,514,691
Less administrative expenses	<u>-572,743</u>	<u>-587,157</u>
Net contribution income	58,644,866	56,128,112
Net investment income	<u>45,891,163</u>	<u>66,681,548</u>
Total income available for benefits	\$104,536,029	\$122,809,660
Less benefit payments:		
Pensions, annuities, refunds and net transfers	-\$74,347,163	-\$70,434,512
Net 3(8)(c) reimbursements	<u>-1,610,781</u>	<u>-2,000,919</u>
Net benefit payments	-\$75,957,944	-\$72,435,431
Change in reserve for future benefits	\$28,578,085	\$50,374,229
Net assets at actuarial value at the end of the year	\$849,286,321	\$820,708,236

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

EXHIBIT D

Development of the Fund Through December 31, 2015

Year Ended December 31	Employer Contributions	Employee Contributions	Net Investment Return*	Administrative Expenses	Benefit Payments	Actuarial Value of Assets at End of Year
2006	\$23,354,603	\$12,607,303	\$91,535,234	\$621,648	\$54,095,226	\$716,796,770
2007	24,166,318	12,829,448	61,690,401	555,774	55,516,831	759,410,332
2008	24,947,158	14,428,460	-108,338,166	554,276	57,999,513	631,893,995
2009	28,505,066	14,190,598	65,765,691	538,983	60,306,394	679,509,973
2010	30,196,905	13,960,465	64,588,917	557,170	62,701,268	724,997,822
2011	32,706,347	13,602,407	7,371,682	569,245	65,998,653	712,110,360
2012	35,409,140	14,720,475	12,627,028	528,845	67,387,464	706,950,694
2013	38,148,683	15,370,951	79,399,464	562,729	68,973,056	770,334,007
2014	41,200,578	15,514,691	66,681,548	587,157	72,435,431	820,708,236
2015	42,703,837	16,513,772	45,891,163	572,743	75,957,944	849,286,321

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

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

EXHIBIT E

Table of Amortization Bases as of July 1, 2015

Type	Annual Payment	Years Remaining	Outstanding Balance
2002 ERI	\$1,535,231	2	\$2,963,353
2010 ERI	548,435	5	2,385,322
Remaining unfunded liability	<u>31,063,484</u>	17	<u>448,378,426</u>
Total	\$33,147,150		\$453,727,101

*Notes: Recommended contributions are assumed to be paid at the beginning of the fiscal year.
Appropriation is calculated to increase 4.0% in fiscal 2018 and 5.85% per year thereafter.
The 2002 and 2010 ERI liabilities are amortized in level payments.
Payment on remaining unfunded liability reflects adjustment to set fiscal 2017 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 2017, excluding the ERI amortizations, is \$42,328,324. 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	--	\$20,631
Auditing	--	20,171
Clerk	--	5,443
DPW – Other	--	122,473
DPW - Parks	--	11,548
DPW – Sewer	\$73,532	32,518
DPW – Water	97,629	124,297
Fire	292,833	--
Health	--	6,582
Housing Authority	146,456	--
Inspectional Services	--	31,185
Library	--	50,895
Police	111,336	13,310
Public Schools	351,188	105,020
Treasury	--	4,362
Other	<u>462,257</u>	<u>--</u>
Total Fiscal Year 2017 Payment	\$1,535,231	\$548,435

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

EXHIBIT G

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) 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 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 463 beneficiaries in pay status and one retired participant in suspended status)	2,722
2. Participants active during the year ended December 31, 2015 with total accumulated contributions of \$178,503,801 and projected 2016 payroll of \$175,910,160	3,275
3. Inactive participants with a vested right to a return of their employee contributions as of December 31, 2015	714
4. Inactive participants with a vested right to a deferred or immediate benefit as of December 31, 2015	73

The actuarial factors as of the January 1, 2016 valuation date are as follows:

1. Total normal cost	\$27,155,573
2. Administrative expenses	600,000
3. Expected employee contributions	<u>-16,628,957</u>
4. Employer normal cost: (1) + (2) + (3)	\$11,126,616
5. Actuarial accrued liability	1,286,899,596
Retired participants and beneficiaries	\$738,049,932
Active participants	535,767,103
Inactive participants	13,082,561
6. Actuarial value of assets (\$797,830,070 at market value as reported in the draft Annual Statement)	<u>849,286,321</u>
7. Unfunded actuarial accrued liability: (5) – (6)	\$437,613,275

The actuarial factors projected to July 1, 2016 are as follows:

1. Employer normal cost	\$11,264,840
2. Projected unfunded actuarial accrued liability	453,727,101
3. Payment on projected unfunded actuarial accrued liability	33,147,150
4. Recommended contribution: (1) + (3)	<u>\$44,411,990</u>
5. Projected payroll	\$178,095,463
6. Total recommended contribution as a percentage of projected payroll: (4) ÷ (5)	24.94%

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.

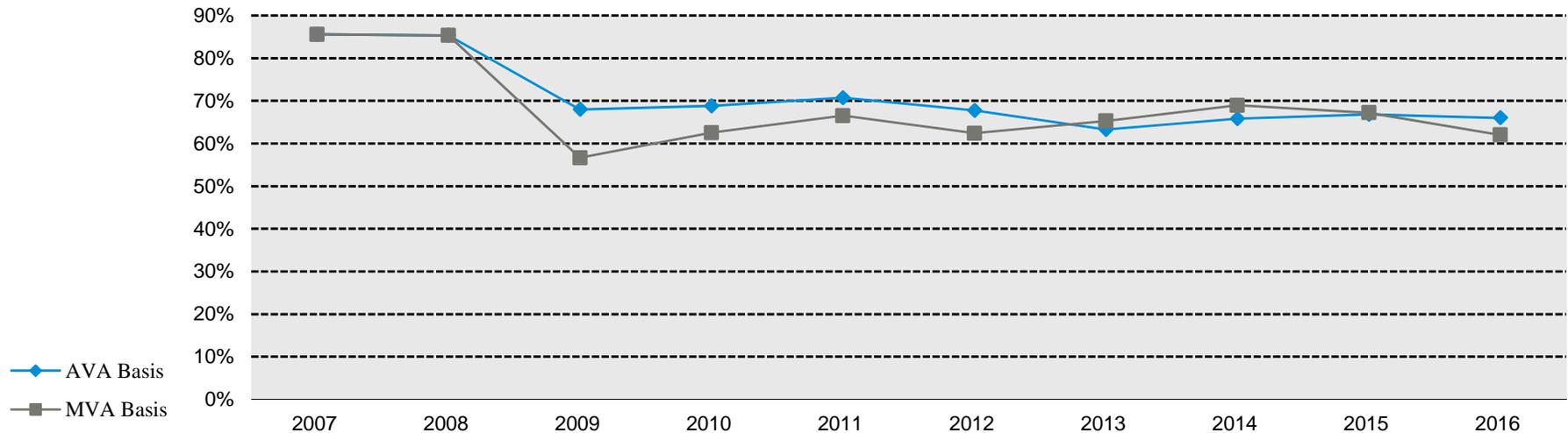
SECTION 4: Reporting Information for the City of Worcester Retirement System

**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 67.20% as of January 1, 2015 to 62.00% as of January 1, 2016. On an actuarial value basis, the funded ratio has decreased from 66.80% as of January 1, 2015 to 65.99% as of January 1, 2016. The chart below depicts a history of the funded ratios for this plan.



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

EXHIBIT III

Actuarial Assumptions and Actuarial Cost Method

Mortality Rates:

Pre-Retirement:

RP-2000 Employee Mortality Table projected generationally with Scale BB2D from 2009 (Previously, RP-2000 Employee Mortality Table projected generationally with Scale AA from 2000)

Healthy Retiree:

RP-2000 Healthy Annuitant Mortality Table projected generationally with Scale BB2D from 2009 (Previously, RP-2000 Healthy Annuitant Mortality Table projected generationally with Scale AA from 2000)

Disabled Retiree:

RP-2000 Healthy Annuitant Mortality Table projected generationally with Scale BB2D from 2015 (Previously, RP-2000 Healthy Annuitant Mortality Table set forward three years for males only projected generationally with Scale AA from 2000)

The underlying tables with generational projection to the ages of participants as of the measurement date reasonably reflect the 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 years' assumptions over the past five years. The mortality tables were then adjusted to future years using the generational projection under Scale BB to reflect future mortality improvement between the measurement date and those years.

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 over the past five years.

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 over the past five years.

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Retirement Age for Inactive Vested Participants:	<p>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.</p> <p>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.</p>
Unknown Data for Participants:	<p>Same as those exhibited by participants with similar known characteristics.</p>
Family Composition:	<p>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 male spouses.</p>
Benefit Election:	<p>All participants are assumed to elect Option A. The benefit election reflects the fact that all benefit options are actuarially equivalent.</p>
Net Investment Return:	<p>7.50% (previously, 7.625%)</p> <p>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.</p>
Salary Scale:	<p>3.50% per year for 2016 and 2017, with an allowance for inflation of 2.50%, and 4.50% per year thereafter, with an allowance for inflation of 3.50% (previously, 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%)</p> <p>The salary scale assumption is a long-term estimate derived from historical data, current and recent market expectations, and professional judgment.</p>
Interest on Employee Contributions:	<p>3.5%</p>
Administrative Expenses:	<p>\$600,000 for calendar 2016, increasing 2.50% per year for 2016 and 2017 and 3.50% per year thereafter (previously, \$600,000 for calendar 2015 increasing 3.0% per year for 2015 and 2016 and 4.0% per year thereafter.)</p> <p>The administrative expense assumption is based on actual experience for 2015.</p>

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2015 Salary:	<p>2015 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).</p> <p>Calendar year 2015 salaries were reduced by 2.0% to reflect retroactive payments that were included in the salary data for all participants, except for firefighters and members of certain school departments that settled their bargaining agreements prior to 2015. Calendar year 2015 salaries for firefighters were increased by 4.0% to reflect unsettled bargaining contracts. Salaries reported were adjusted to reflect the inclusion of a 53rd pay period for members of departments paid on a weekly basis.</p>
Total Service:	<p>Total creditable service reported in the data. If missing, total creditable service estimated from adjusted date of hire.</p>
Net 3(8)(c) Liability:	<p>Estimated liability of \$16.4 million (previously, \$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.</p>
Actuarial Value of Assets:	<p>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.</p>
Actuarial Cost Method:	<p>Entry Age Normal Actuarial Cost Method. Entry Age is the attained 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.</p>

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Changes in Assumptions:

Based on past experience and future expectations, the following actuarial assumptions were changed as of January 1, 2016:

- The net investment return assumption was lowered from 7.625% to 7.5%.
- The salary scale assumption was changed from 3.50% per year for 2016 and 4.50% per year thereafter, including an allowance for inflation of 3.00% for 2016 and 4.00% per year thereafter to 3.50% per year for 2016 and 2017 and 4.50% thereafter, including an allowance for inflation of 2.50% for 2016 and 2017 and 3.50% thereafter.
- The pre-retirement mortality assumption was changed from the RP-2000 Employee Mortality Table projected generationally using Scale AA from 2000 to the RP-2000 Employee Mortality Table projected generationally using Scale BB2D from 2009.
- The post-retirement mortality assumption for non-disabled participants was changed from the RP-2000 Healthy Annuitant Mortality Table projected generationally using Scale AA from 2000 to the RP-2000 Healthy Annuitant Mortality Table projected generationally using Scale BB2D from 2009.
- The mortality assumption for disabled participants was changed from the RP-2000 Healthy Annuitant Mortality Table set forward three years for males only projected generationally using Scale AA from 2000 to the RP-2000 Healthy Annuitant Mortality Table projected generationally with Scale BB2D from 2015.
- The increase in liability to account for anticipated net 3(8)(c) payments was changed from \$17.0 million to \$16.4 million based on the average annual net 3(8)(c) benefits of the prior two years and the average demographics of retired participants.

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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

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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

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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

<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 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%.

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.

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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.

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

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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.

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-

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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: None.

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EXHIBIT 1

Net Pension Liability

The components of the net pension liability of the City of Worcester Retirement System are as follows:

	December 31, 2015	December 31, 2014
Total pension liability	\$1,286,899,596	\$1,228,554,779
Plan fiduciary net position	797,830,070	825,633,173
System's net pension liability	489,069,526	402,921,606
Plan fiduciary net position as a percentage of the total pension liability*	62.00%	67.20%

* *These funded percentages 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.*

Actuarial assumptions. The total pension liability as of December 31, 2015 was determined by an actuarial valuation as of December 31, 2015, using the following actuarial assumptions, applied to all periods included in the measurement:

Inflation	2.5% per year for 2016 and 2017 and 3.5% per year thereafter
Salary increases	3.5% per year for 2016 and 2017 and 4.5% per year thereafter
Investment rate of return	7.5%, 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 with Scale BB2D from 2009
Healthy Retiree:	RP-2000 Healthy Annuitant Mortality Table projected generationally with Scale BB2D from 2009
Disabled Retiree:	RP-2000 Healthy Annuitant Mortality Table projected generationally with Scale BB2D from 2015

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, 2015 are summarized in the following table:

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Asset Class	Long-Term Expected Real Rate of Return
Domestic equity	6.49%
International developed markets equity	7.16%
International emerging markets equity	9.46%
Core fixed income	1.68%
High-yield fixed income	4.76%
Real estate	4.37%
Commodities	4.13%
Hedge fund, GTAA, Risk parity	3.60%
Private equity	11.04%
Cash	1.11%

Discount rate sensitivity

Discount rate: The discount rate used to measure the total pension liability was 7.5%. 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 7.5%, as well as what the net pension liability would be if it were calculated using a discount rate that is 1-percentage-point lower (6.5%) or 1-percentage-point higher (8.5%) than the current rate:

	1% Decrease (6.5%)	Current Discount (7.5%)	1% Increase (8.5%)
City of Worcester Retirement System's net pension liability as of December 31, 2015	\$630,425,436	\$489,069,526	\$369,148,401

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EXHIBIT 2

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

	Year End December 31,									
	2015	2014	2013	2012	2011	2010	2009	2008	2007	2006
Total pension liability										
Service cost	\$26,309,138	\$24,977,553								
Interest	92,787,477	89,852,374								
Differences between expected and actual experience	-1,619,304	-901,542								
Changes of assumptions	16,825,451	16,436,189								
Changes of benefit terms	--	--								(Historical information prior to implementation of GASB 67/68 is not required)
Benefit payments, including refunds of employee contributions	-75,957,945	-72,435,430								
Net change in total pension liability	\$58,344,817	\$57,929,144								
Total pension liability - beginning	1,228,554,779	1,170,625,635								
Total pension liability - ending (a)	\$1,286,899,596	\$1,228,554,779								
Plan fiduciary net position										
Contributions - employer	\$42,703,837	\$41,200,578								
Contributions - employee	16,513,772	15,514,691								
Net investment income	-10,490,024	34,950,209								
Benefit payments, including refunds of employee contributions	-75,957,945	-72,435,430								(Historical information prior to implementation of GASB 67/68 is not required)
Employee expenses	-572,743	-587,157								
Net change in fiduciary net position	-\$27,803,103	\$18,642,891								
Plan fiduciary net position - beginning	825,633,173	806,990,282								
Plan fiduciary net position - ending (b)	\$797,830,070	\$825,633,173								
Net pension liability – ending: (a)-(b)	\$489,069,526	\$402,921,606								
Plan's fiduciary net position as a percentage of the total pension liability	62.00%	67.20%								(Historical information prior to implementation of GASB 67/68 is not required)
Covered-employee payroll	\$173,759,691	\$168,856,039								
Net pension liability as a percentage of covered-employee payroll	281.46%	238.62%								

Notes: Covered-employee payroll for 2015 and 2014 as estimated in each year's January 1 funding valuation report.

Covered employee payroll for 2014 has been restated to reflect a change in the definition of covered payroll under GASB Statement No. 82.

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EXHIBIT 3

Schedule of Contributions – Last Ten Years

	Year End December 31,									
	2015	2014	2013	2012	2011	2010	2009	2008	2007	2006
Actuarially determined contribution	\$42,703,837	\$41,200,578								
Contributions in relation to the actuarially determined contribution	<u>42,703,837</u>	<u>41,200,578</u>								
Contribution deficiency (excess)	\$0	\$0								
Covered-employee payroll	173,759,691	168,856,039								
Contributions as a percentage of covered-employee payroll	24.58%	24.40%								

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

Note: Based on the results of the actuarial valuation as of the prior January 1 (including assumptions and methods) which determined budgeted appropriation for the following fiscal year.

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EXHIBIT 4

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

A. Pension expense for the year ended June 30, 2016

Service cost	\$26,309,138
Interest	92,787,477
Contributions – employee	-16,513,772
Projected earnings on pension plan investments	-62,294,468
Administrative expenses	572,743
Recognized portion of current-period difference between expected and actual experience	-269,884
Recognized portion of current-period difference between projected and actual earnings on pension plan investments	14,556,898
Recognized portion of current year period assumption change	2,804,242
Recognized portion of current year period plan change	0
Recognition of deferred outflows of resources	8,131,291
Recognition of deferred inflows of resources	<u>-150,257</u>
Pension expense for fiscal year ended June 30, 2016	\$65,933,408

B. Deferred outflows/inflows of resources related to pensions

	Deferred Outflows of Resources	Deferred Inflows of Resources
Differences between expected and actual experience	\$0	\$1,950,448
Changes of assumptions	24,978,668	0
Net difference between projected and actual earnings on pension plan investments	<u>74,403,371</u>	<u>0</u>
Total	\$99,382,039	\$1,950,448

C. Projected recognition of deferred outflows/(inflows)

	Year Ended June 30,	Recognition
	2017	\$25,072,290
	2018	25,072,290
	2019	25,072,289
	2020	19,680,365
	2021	2,534,357
	Thereafter	0

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EXHIBIT 5

Determination of Proportionate Share

Employer Name	FY 2015 Total Appropriation	Percent of FY 2015 Total Appropriation	Share of NPL as of January 1, 2015	FY 2016 Total Appropriation	Percent of FY 2016 Total Appropriation	Share of NPL as of January 1, 2016
City of Worcester	\$35,966,964	87.297232%	\$351,739,409	\$37,075,645	86.820407%	\$424,612,154
Worcester Housing Authority	2,994,914	7.269107%	29,288,803	3,387,794	7.933231%	38,799,015
Water Enterprise Fund	1,493,962	3.626070%	14,610,219	1,480,117	3.466005%	16,951,174
Sewer Enterprise Fund	707,187	1.716449%	6,915,944	722,605	1.692131%	8,275,697
Golf Enterprise Fund	37,551	0.091142%	367,231	37,676	0.088226%	431,486
Grand Totals:	\$41,200,578	100.000000%	\$402,921,606	\$42,703,837	100.000000%	\$489,069,526

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

EXHIBIT 6

Determination of Pension Amounts by Employer as of June 30, 2016

Employer Name	Employer's Proportionate Share Allocation (1)	Net Pension Liability (2)	Covered Employee Payroll (3)	Discount Rate Sensitivity		
				1% Decrease (6.50%) (4)	Current Discount Rate (7.50%) (5)	1% Increase (8.50%) (6)
City of Worcester	86.820407%	\$424,612,154	\$150,858,870	\$547,337,930	\$424,612,154	\$320,496,144
Worcester Housing Authority	7.933231%	38,799,015	\$13,784,758	50,013,106	38,799,015	29,285,395
Water Enterprise Fund	3.466005%	16,951,174	\$6,022,520	21,850,577	16,951,174	12,794,702
Sewer Enterprise Fund	1.692131%	8,275,697	\$2,940,242	10,667,624	8,275,697	6,246,475
Golf Enterprise Fund	0.088226%	431,486	\$153,301	556,199	431,486	325,685
Grand Totals:	100.000000%	\$489,069,526	\$173,759,691	\$630,425,436	\$489,069,526	\$369,148,401

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Employer Name	Schedule of Contributions				Pension Expense		
	Statutory Required Contribution (7)	Contributions In Relation to the Statutory Required Contribution (8)	Contribution Deficiency/ (Excess) (9)	Contributions as a Percentage of Covered Employee Payroll (10)	Proportionate Share of Plan Pension Expense (11)	Net Amortization of Deferred Amounts from Changes in Proportion and Differences Between Employer Contributions and Proportionate Share of Contributions (12)	Total Employer Pension Expense (13)
City of Worcester	\$37,075,645	-\$37,075,645	--	24.58%	\$57,243,653	-\$292,777	\$56,950,876
Worcester Housing Authority	3,387,794	-3,387,794	--	24.58%	5,230,650	407,781	5,638,431
Water Enterprise Fund	1,480,117	-1,480,117	--	24.58%	2,285,255	-98,282	2,186,973
Sewer Enterprise Fund	722,605	-722,605	--	24.58%	1,115,680	-14,932	1,100,748
Golf Enterprise Fund	37,676	-37,676	--	24.58%	58,170	-1,790	56,380
Grand Totals:	\$42,703,837	-\$42,703,837	--	24.58%	\$65,933,408	--	\$65,933,408

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Employer Name	Deferred Outflows of Resources					Deferred Inflows of Resources				
	Differences Between Expected and Actual Experience (14)	Net Difference Between Projected and Actual Pension Plan Investments (15)	Changes of Assumptions (16)	Changes in Proportion and Differences Between Employer Contributions and Proportionate Share of Contributions (17)	Total Deferred Outflows of Resources (18)	Differences Between Expected and Actual Experience (19)	Net Difference Between Projected and Actual Pension Plan Investments (20)	Changes of Assumptions (21)	Changes in Proportion and Differences Between Employer Contributions and Proportionate Share of Contributions (22)	Total Deferred Inflows of Resources (23)
City of Worcester	--	\$64,597,309	\$21,686,581	--	\$86,283,890	\$1,693,387	--	--	\$1,463,887	\$3,157,274
Worcester Housing Authority	--	5,902,591	1,981,615	\$2,038,907	9,923,113	154,734	--	--	--	154,734
Water Enterprise Fund	--	2,578,825	865,762	--	3,444,587	67,603	--	--	491,410	559,013
Sewer Enterprise Fund	--	1,259,003	422,672	--	1,681,675	33,004	--	--	74,658	107,662
Golf Enterprise Fund	--	65,643	22,038	--	87,681	1,720	--	--	8,952	10,672
Grand Totals:	--	\$74,403,371	\$24,978,668	\$2,038,907	\$101,420,946	\$1,950,448	--	--	\$2,038,907	\$3,989,355

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**Deferred Inflows/(Outflows) Recognized In Future Pension Expense
(Year Ended June 30):**

Employer Name	2017 (24)	2018 (25)	2019 (26)	2020 (27)	2021 (28)	Thereafter (29)
City of Worcester	\$21,475,087	\$21,475,087	\$21,475,086	\$16,793,796	\$1,907,560	--
Worcester Housing Authority	2,396,824	2,396,824	2,396,824	1,969,070	608,837	--
Water Enterprise Fund	770,725	770,725	770,725	583,840	-10,441	--
Sewer Enterprise Fund	409,324	409,324	409,324	318,086	27,955	--
Golf Enterprise Fund	20,330	20,330	20,330	15,573	446	--
Grand Totals:	\$25,072,290	\$25,072,290	\$25,072,289	\$19,680,365	\$2,534,357	--

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 2018 is determined with the January 1, 2016 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% in fiscal 2018 and 5.85% per year thereafter.
Remaining amortization period	2 years from July 1, 2016 for the 2002 ERI liability, 5 years from July 1, 2016 for the 2010 ERI liability and 17 years from July 1, 2016 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	7.5% (previously, 7.625%)
Discount rate	7.5% (previously, 7.625%)
Inflation rate	2.50% for 2016 and 2017, and 3.50% thereafter (previously, 3.00% for 2015 and 2016, and 4.00% thereafter)
Projected salary increases	3.50% for 2016 and 2017, and 4.50% thereafter (previously, 3.50% for 2015 and 2016, 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	2,722
Inactive participants entitled to a return of their employee contributions	714
Inactive participants with a vested right to a deferred or immediate benefit	73
Active participants	<u>3,275</u>
Total	6,784

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Changes in Assumptions:

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.

Effective January 1, 2016:

- The net investment return assumption was lowered from 7.625% to 7.5%.
- The salary scale assumption was changed from 3.50% per year for 2016 and 4.50% per year thereafter, including an allowance for inflation of 3.00% for 2016 and 4.00% per year thereafter to 3.50% per year for 2016 and 2017 and 4.50% thereafter, including an allowance for inflation of 2.50% for 2016 and 2017 and 3.50% thereafter.
- The pre-retirement mortality assumption was changed from the RP-2000 Employee Mortality Table projected generationally using Scale AA from 2000 to the RP-2000 Employee Mortality Table projected generationally using Scale BB2D from 2009.
- The post-retirement mortality assumption for non-disabled participants was changed from the RP-2000 Healthy Annuitant Mortality Table projected generationally using Scale AA from 2000 to the RP-2000 Healthy Annuitant Mortality Table projected generationally using Scale BB2D from 2009.
- The mortality assumption for disabled participants was changed from the RP-2000 Healthy Annuitant Mortality Table set forward three years for males only projected generationally using Scale AA from 2000 to the RP-2000 Healthy Annuitant Mortality Table projected generationally with Scale BB2D from 2015.

Changes in Plan Provisions:

Effective January 1, 2015:

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.

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Appendix A

Glossary

Definitions of certain terms *as they are used in Statement 68*; the terms may have different meanings in other contexts.

Active employees:	Individuals employed at the end of the reporting or measurement period, as applicable.
Actual contributions:	Cash contributions recognized as additions to a pension plan's fiduciary net position.
Actuarial present value of projected benefit payments:	Projected benefit payments discounted to reflect the expected effects of the time value (present value) of money and the probabilities of payment.
Actuarial valuation:	The determination, as of a point in time (the actuarial valuation date), of the service cost, total pension liability, and related actuarial present value of projected benefit payments for pensions performed in conformity with Actuarial Standards of Practice unless otherwise specified by the GASB.
Actuarial valuation date:	The date as of which an actuarial valuation is performed.
Actuarially determined contribution:	A target or recommended contribution to a defined benefit pension plan for the reporting period, determined in conformity with Actuarial Standards of Practice based on the most recent measurement available when the contribution for the reporting period was adopted.
Ad hoc cost-of-living adjustments (ad hoc COLAs):	Cost-of-living adjustments that require a decision to grant by the authority responsible for making such decisions.
Ad hoc postemployment benefit changes:	Postemployment benefit changes that require a decision to grant by the authority responsible for making such decisions.
Agent employer:	An employer whose employees are provided with pensions through an agent multiple-employer defined benefit pension plan.

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Agent multiple-employer defined benefit pension plan (agent pension plan):

A multiple-employer defined benefit pension plan in which pension plan assets are pooled for investment purposes but separate accounts are maintained for each individual employer so that each employer's share of the pooled assets is legally available to pay the benefits of only its employees.

Allocated insurance contract:

A contract with an insurance company under which related payments to the insurance company are currently used to purchase immediate or deferred annuities for individual employees. Also may be referred to as an annuity contract.

Automatic cost-of-living adjustments (automatic COLAs):

Cost-of-living adjustments that occur without a requirement for a decision to grant by a responsible authority, including those for which the amounts are determined by reference to a specified experience factor (such as the earnings experience of the pension plan) or to another variable (such as an increase in the consumer price index).

Automatic postemployment benefit changes:

Postemployment benefit changes that occur without a requirement for a decision to grant by a responsible authority, including those for which the amounts are determined by reference to a specified experience factor (such as the earnings experience of the pension plan) or to another variable (such as an increase in the consumer price index).

Closed period:

A specific number of years that is counted from one date and declines to zero with the passage of time. For example, if the recognition period initially is five years on a closed basis, four years remain after the first year, three years after the second year, and so forth.

Collective deferred outflows of resources and deferred inflows of resources related to pensions:

Deferred outflows of resources and deferred inflows of resources related to pensions arising from certain changes in the collective net pension liability.

Collective net pension liability:

The net pension liability for benefits provided through (1) a cost-sharing pension plan or (2) a single-employer or agent pension plan in circumstances in which there is a special funding situation.

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Collective pension expense:	Pension expense arising from certain changes in the collective net pension liability.
Contributions:	Additions to a pension plan’s fiduciary net position for amounts from employers, nonemployer contributing entities (for example, state government contributions to a local government pension plan), or employees. Contributions can result from cash receipts by the pension plan or from recognition by the pension plan of a receivable from one of these sources.
Cost-of-living adjustments:	Postemployment benefit changes intended to adjust benefit payments for the effects of inflation.
Cost-sharing employer:	An employer whose employees are provided with pensions through a cost-sharing multiple-employer defined benefit pension plan.
Cost-sharing multiple-employer defined benefit pension plan (cost-sharing pension plan):	A multiple-employer defined benefit pension plan in which the pension obligations to the employees of more than one employer are pooled and pension plan assets can be used to pay the benefits of the employees of any employer that provides pensions through the pension plan.
Covered-employee payroll:	The payroll of employees that are provided with pensions through the pension plan.
Deferred retirement option program (DROP):	A program that permits an employee to elect a calculation of benefit payments based on service credits and salary, as applicable, as of the DROP entry date. The employee continues to provide service to the employer and is paid for that service by the employer after the DROP entry date; however, the pensions that would have been paid to the employee (if the employee had retired and not entered the DROP) are credited to an individual employee account within the defined benefit pension plan until the end of the DROP period.
Defined benefit pension plans:	Pension plans that are used to provide defined benefit pensions.

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- Defined benefit pensions:** Pensions for which the income or other benefits that the employee will receive at or after separation from employment are defined by the benefit terms. The pensions may be stated as a specified dollar amount or as an amount that is calculated based on one or more factors such as age, years of service, and compensation. (A pension that does not meet the criteria of a defined contribution pension is classified as a defined benefit pension for purposes of Statement 68.)
- Defined contribution pension plans:** Pension plans that are used to provide defined contribution pensions.
- Defined contribution pensions:** Pensions having terms that (1) provide an individual account for each employee; (2) define the contributions that an employer is required to make (or the credits that it is required to provide) to an active employee's account for periods in which that employee renders service; and (3) provide that the pensions an employee will receive will depend only on the contributions (or credits) to the employee's account, actual earnings on investments of those contributions (or credits), and the effects of forfeitures of contributions (or credits) made for other employees, as well as pension plan administrative costs, that are allocated to the employee's account.
- Discount rate:** The single rate of return that, when applied to all projected benefit payments, results in an actuarial present value of projected benefit payments equal to the total of the following:
1. The actuarial present value of benefit payments projected to be made in future periods in which (a) the amount of the pension plan's fiduciary net position is projected (under the requirements of Statement 68) to be greater than the benefit payments that are projected to be made in that period and (b) pension plan assets up to that point are expected to be invested using a strategy to achieve the long-term expected rate of return, calculated using the long-term expected rate of return on pension plan investments.
 2. The actuarial present value of projected benefit payments not included in (1), calculated using the municipal bond rate.

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Entry age actuarial cost method:	A method under which the actuarial present value of the projected benefits of each individual included in an actuarial valuation is allocated on a level basis over the earnings or service of the individual between entry age and assumed exit age(s). The portion of this actuarial present value allocated to a valuation year is called the <i>normal cost</i> . The portion of this actuarial present value not provided for at a valuation date by the actuarial present value of future normal costs is called the <i>actuarial accrued liability</i> .
Inactive employees:	Terminated individuals that have accumulated benefits but are not yet receiving them, and retirees or their beneficiaries currently receiving benefits.
Measurement period:	The period between the prior and the current measurement dates.
Multiple-employer defined benefit pension plan:	A defined benefit pension plan that is used to provide pensions to the employees of more than one employer.
Net pension liability:	The liability of employers and nonemployer contributing entities to employees for benefits provided through a defined benefit pension plan.
Nonemployer contributing entities:	Entities that make contributions to a pension plan that is used to provide pensions to the employees of other entities. For purposes of Statement 68, employees are not considered nonemployer contributing entities.
Other postemployment benefits:	All postemployment benefits other than retirement income (such as death benefits, life insurance, disability, and long-term care) that are provided separately from a pension plan, as well as postemployment healthcare benefits, regardless of the manner in which they are provided. Other postemployment benefits do not include termination benefits. ⁴
Pension plans:	Arrangements through which pensions are determined, assets dedicated for pensions are accumulated and managed, and benefits are paid as they come due.
Pensions:	Retirement income and, if provided through a pension plan, postemployment benefits other than retirement income (such as death benefits, life insurance, and disability benefits). Pensions do not include postemployment healthcare benefits and termination benefits.

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Plan members:	Individuals that are covered under the terms of a pension plan. Plan members generally include (1) employees in active service (active plan members) and (2) terminated employees who have accumulated benefits but are not yet receiving them and retirees or their beneficiaries currently receiving benefits (inactive plan members).
Postemployment:	The period after employment.
Postemployment benefit changes:	Adjustments to the pension of an inactive employee.
Postemployment healthcare benefits:	Medical, dental, vision, and other health-related benefits paid subsequent to the termination of employment.
Projected benefit payments:	All benefits estimated to be payable through the pension plan to current active and inactive employees as a result of their past service and their expected future service.
Public employee retirement system:	A special-purpose government that administers one or more pension plans; also may administer other types of employee benefit plans, including postemployment healthcare plans and deferred compensation plans.
Real rate of return:	The rate of return on an investment after adjustment to eliminate inflation.
Service costs:	The portions of the actuarial present value of projected benefit payments that are attributed to valuation years.
Single employer:	An employer whose employees are provided with pensions through a single-employer defined benefit pension plan.
Single-employer defined benefit pension plan (single-employer pension plan):	A defined benefit pension plan that is used to provide pensions to employees of only one employer.
Special funding situations:	<p>Circumstances in which a nonemployer entity is legally responsible for making contributions directly to a pension plan that is used to provide pensions to the employees of another entity or entities and either of the following conditions exists:</p> <p>The amount of contributions for which the nonemployer entity legally is responsible is <i>not</i> dependent upon one or more events or circumstances unrelated to the pensions.</p> <p>The nonemployer entity is the only entity with a legal obligation to make contributions directly to a pension plan.</p>

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Termination benefits:

Inducements offered by employers to active employees to hasten the termination of services, or payments made in consequence of the early termination of services. Termination benefits include early-retirement incentives, severance benefits, and other termination-related benefits.

Total pension liability:

The portion of the actuarial present value of projected benefit payments that is attributed to past periods of employee service in conformity with the requirements of Statement.