

## **Pennsylvania Municipal Retirement System**

### **Actuarial Valuation as of January 1, 2015**

**Produced by Cheiron**

**May 2016**

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May 31, 2016

Pennsylvania Municipal Retirement Board of the  
Pennsylvania Municipal Retirement System  
c/o Stephen W. Vaughn, Secretary  
P.O. Box 1165  
Harrisburg, PA 17108-1165

***Re: PMRS 2015 Actuarial Valuation Report***

Dear Members of the Board:

At your request, we have conducted the annual actuarial valuation of the Pennsylvania Municipal Retirement System (System) as of January 1, 2015. This report includes the valuation of the municipal and authority employer's traditional defined benefit and cash balance plans and reflects a roll-forward of the county plans administered by the System. The roll-forward valuation method reflects an adjustment to the active and terminated vested liabilities to January 1, 2015 with an explicit valuation of the retirees as of January 1, 2015. The results of the aggregation of these valuations are contained in this report in the development of the System's results.

The purpose of this report is to present the annual actuarial valuation of the Pennsylvania Municipal Retirement System which is discussed in more detail in the Foreword section of this report. This report was prepared for the Pennsylvania Municipal Retirement Board of the Pennsylvania Municipal Retirement System for the purposes described herein and for the use by the plan auditor in completing an audit related to the matters herein. Other users of this report are not intended users as defined in the Actuarial Standards of Practice, and Cheiron assumes no duty or liability to such other users.

This report contains analyses which combine asset and liability performance and projections. PMRS is an Agent Multiple Employer retirement system (as defined under Governmental Accounting Standards Board Statements No. 67 and 68) for participating municipalities and counties. Assets and liabilities are separately accounted for and reported to the Public Employee Retirement Commission of the Commonwealth of Pennsylvania. This report reflects aggregate valuation results for the System. The report provides statistics on employer contribution levels for all plans participating in the system as of the valuation date, January 1, 2015, as well as required disclosures under the Governmental Accounting Standards Board (GASB) Statement No. 67, which replaced GASB Statement No. 25, for plans with valuation dates after June 30, 2014 for the entire System.

Your attention is called to the Foreword and Board Summary in which we refer to the general approach employed in the preparation of this report, a big picture view of the System, historical trends developed by Cheiron, and future stress testing of the System. The trend data developed prior to January 1, 2007 was developed by the prior actuary. We also comment on the sources and reliability of both the data and the actuarial assumptions on which our findings are based.

Pennsylvania Municipal Retirement Board of the  
Pennsylvania Municipal Retirement System  
May 31, 2016

All municipalities that were required to file an Act 205 form as of January 1, 2015, had their liabilities explicitly calculated. The county plan liabilities were previously valued as of January 1, 2014, and were actuarially adjusted and included in this report to represent a valuation of the System from year to year. The liabilities associated with the cash balance plans are based on the member and municipal account balances, as provided by PMRS, as well as the explicit liabilities associated with retirees in these plans. To the extent that the System's experience deviates from the underlying assumptions and methods, or there are any changes in member municipal plan provisions or the applicable laws governing the member plans or the System, the results would vary accordingly.

To the best of our knowledge, this report and its contents have been prepared in accordance with generally recognized and accepted actuarial principles and practices which are consistent with the Code of Professional Conduct and applicable Actuarial Standards of Practice set out by the Actuarial Standards Board. Furthermore, as credentialed actuaries, we meet the Qualification Standards of the American Academy of Actuaries to render the opinion contained in this report. This report does not address any contractual or legal issues. We are not attorneys and our firm does not provide any legal services or advice.

Sincerely,  
Cheiron

Kenneth A. Kent, FSA, FCA, MAAA  
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**PENNSYLVANIA MUNICIPAL RETIREMENT SYSTEM  
ACTUARIAL VALUATION AS OF JANUARY 1, 2015**

**FOREWORD**

Cheiron has performed the actuarial valuation of the Pennsylvania Municipal Retirement System (System) as of January 1, 2015. The purpose of this report is to:

- 1) **Measure and disclose**, as of the valuation date, the financial condition of the System;
- 2) **Indicate trends** in the financial progress of the System;
- 3) **Provide specific information** and documentation required by the Governmental Accounting Standards Board (GASB).

An actuarial valuation establishes and analyzes System assets and liabilities on a consistent basis and traces the progress of both from one year to the next. It includes measurement of the System's investment performance as well as an analysis of actuarial liability gains and losses.

**Section I** presents a summary containing our findings and disclosing important trends experienced by the System in recent years.

**Section II** contains details on various asset measures, together with pertinent performance measurements.

**Section III** shows similar information on System liabilities, measured for actuarial, accounting, and government reporting purposes.

**Section IV** shows the distribution of the county plans' contribution rates by component.

**Section V** includes the required disclosures needed for the System's financial statements and under GASB Statement No. 67.

The appendices to this report contain a summary of the System's membership at the valuation date, and the actuarial methods and assumptions used in the valuations.

As this System is an Agent Multiple Employer retirement system in which each of the participating municipalities are entitled to define and submit to the Board the benefit provisions for their respective employees, the actual plan provisions are not included in this report. We based our results on the plan provisions defined and submitted to the State under the 2014 Act 293 filings and 2015 Act 205 filings in preparing this valuation as provided by the System. We have rolled forward the liabilities for all county plans and used the explicitly calculated liabilities for all defined benefit plans required to submit a valuation under Act 205 as of January 1, 2015. To roll forward liabilities for county plans, we used the 2014 results to estimate the liabilities for the active and deferred vested participants in these plans to provide an overall measure of the funded status of the System.

**PENNSYLVANIA MUNICIPAL RETIREMENT SYSTEM  
ACTUARIAL VALUATION AS OF JANUARY 1, 2015**

**FOREWORD**

In preparing our report, we relied on information (some oral and some written) supplied by the System's staff. This information includes, but is not limited to, plan provisions, employee data, and financial information. We performed an informal examination of the obvious characteristics of the data by plan for all the traditional defined benefit plans and in aggregate for the cash balance plans for reasonableness and consistency in accordance with Actuarial Standard of Practice #23.

The actuarial assumptions reflect the Board's understanding of the likely future experience of the System, as well as adopted formal procedures in the setting of the interest rate assumption and the assumptions as a whole represent the best estimate for the future experience of the System based on the trends and results of periodic experience analysis performed as required under Act 205. The results of this report are dependent upon future experience conforming to these assumptions. To the extent that future experience deviates from the actuarial assumptions, the true cost for each of the plans could vary from our results.

Future valuation reports may differ significantly from the current report presented in this document due to such factors as the following: plan experience differing from that anticipated by the assumptions; changes in assumptions; and changes in plan provisions or applicable law.

Finally, in preparing this report, we have conformed to generally accepted actuarial principles and practices which are consistent with the Code of Professional Conduct, and applicable Actuarial Standards of Practice set out by the Actuarial Standards Board.

To the extent the laws of the Commonwealth of Pennsylvania and/or the administrative practices of the System differ from Actuarial Standards of Practice, we have identified such deviations within the assumption section of this report.

**PENNSYLVANIA MUNICIPAL RETIREMENT SYSTEM  
ACTUARIAL VALUATION AS OF JANUARY 1, 2015**

**SECTION I  
BOARD SUMMARY**

**General Comments**

The primary purpose of the actuarial valuation and this report is to disclose the following as of the valuation date:

- The overall financial condition of the Pennsylvania Municipal Retirement System,
- Biennial valuation of the non-county plans participating in the System,
- Past trends and expected future trends in the System's financial condition, and
- Information required by the Governmental Accounting Standards Board (GASB) and the System's Financial Statements.

In this Section, we present a summary of the principal valuation results. This includes the basis upon which the January 1, 2015 valuation was completed and an examination of the current financial condition of the System. In addition, we present a review of the key historical trends followed by the System's projected financial outlook.

The municipal plans are valued every other year. Throughout our report, our discussion will address changes from January 1, 2013, the last time the municipal plans were valued, to January 1, 2015. In other parts of the discussion, we address the overall status of the System. In this case, we compare results from January 1, 2014 to January 1, 2015 to identify the changes in the overall System's funded status. The January 1, 2014 valuation results reflect the explicit valuation of the cash balance and county pension plans, and a roll-forward of the liabilities for all municipal defined benefit based upon the January 1, 2013 results.

**A. Valuation Basis**

We identify the following key results of this valuation.

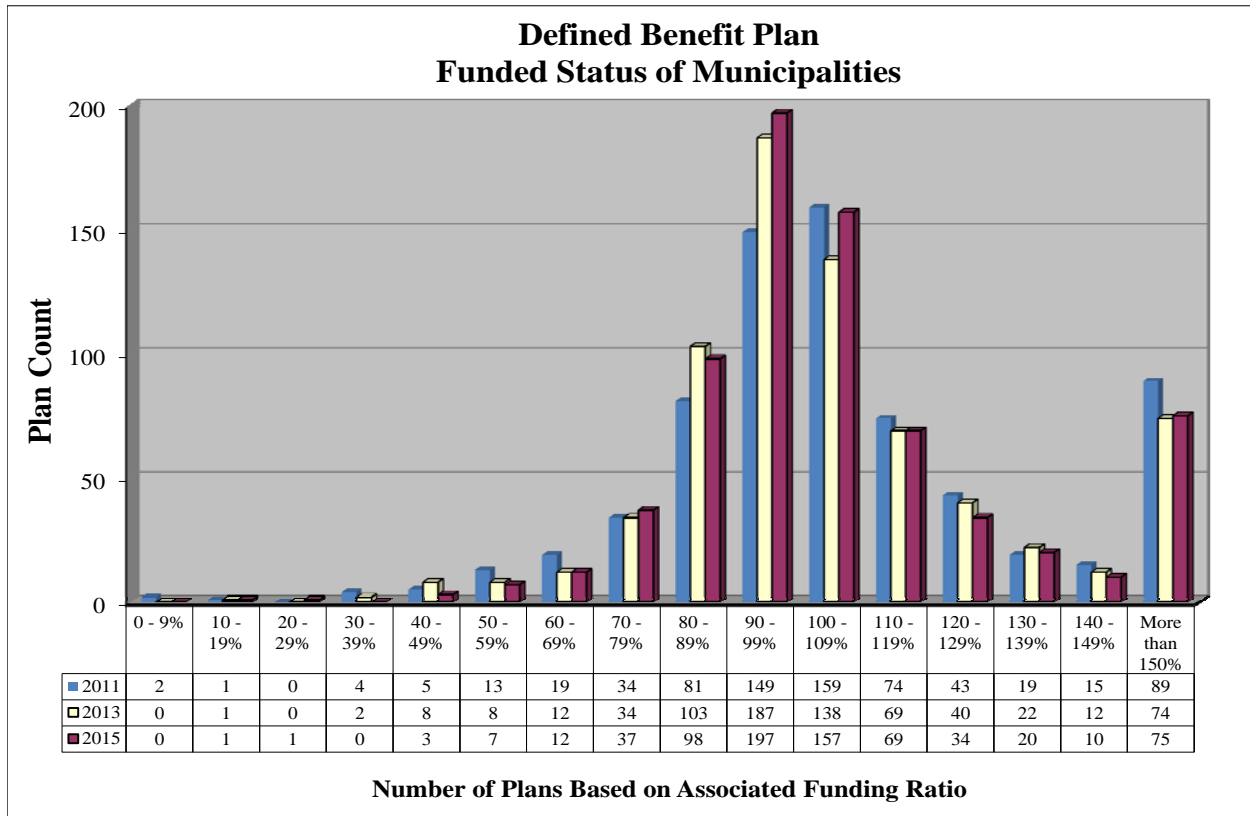
- *Unfunded Actuarial Liability:* The Unfunded Actuarial Liability is the excess of the System's Actuarial Liability over the Actuarial Value of Assets. Because the System is made up of many plans, some with an Unfunded Actuarial Liability and others with surplus (when the Actuarial Value of Assets is greater than the Actuarial Liability), the aggregate changes for each of these values combined provides the net funded level of the System. In aggregate, the System is in a net surplus position of \$14.2 million compared to a deficit of \$32.9 million as of January 1, 2014. Much of this deficit was made up in contributions during the 2014 calendar year, specifically a one-time contribution in the form of a pension obligation bond of \$27.4 million to reduce one municipality's unfunded pension liability.
- On a snap shot basis, comparing the Market Value of Assets to Actuarial Liability provides information of the progress of the System's funding status. As of January 1, 2015 the Actuarial Liability exceeded the Market Value of Assets resulting in an unfunded liability of \$17.65 million. This represents an improvement compared to the unfunded liability of \$54.0 million as of January 1, 2014. This improvement again is primarily due to the additional \$27.4 million contribution.

**PENNSYLVANIA MUNICIPAL RETIREMENT SYSTEM  
ACTUARIAL VALUATION AS OF JANUARY 1, 2015**

**SECTION I  
BOARD SUMMARY**

- *Funding Ratio:* This is the ratio of the System’s Actuarial Value of Assets to Actuarial Liability. The funding ratio increased from 98.4% as of January 1, 2014 to 100.7% as of January 1, 2015.
- *System Experience:* On an Actuarial Value of Assets basis the return is 5.50% based upon the regular interest rate determined by PMRS. However, on a Market Value of Assets basis the average investment return for the year ending December 31, 2014 was actually 5.2% based on dollar weighted return rate calculation used to measure the System’s experience for valuation purposes (this may differ from the time-weighted return rate of 5.7% published by the investment consultant as the dollar-weighted method assumes all cash flows occur mid-year). The overall favorable investment returns over the last 6 years have enabled the System to approach full funding based on the Market Value of Assets, which has not occurred since January 1, 2008.

The following chart shows a distribution of the funded status using actuarial value of assets of the plans covered by the System in 2011, 2013 and 2015. In 2013, the Board approved a reduction in the discount rate from 6.0% to 5.5%. This assumption change increased liabilities, decreasing funding ratios compared to 2011. In 2015, the pension plans as a whole are paying down their unfunded liabilities, representing an overall improvement in the funding status of the plans since 2013.



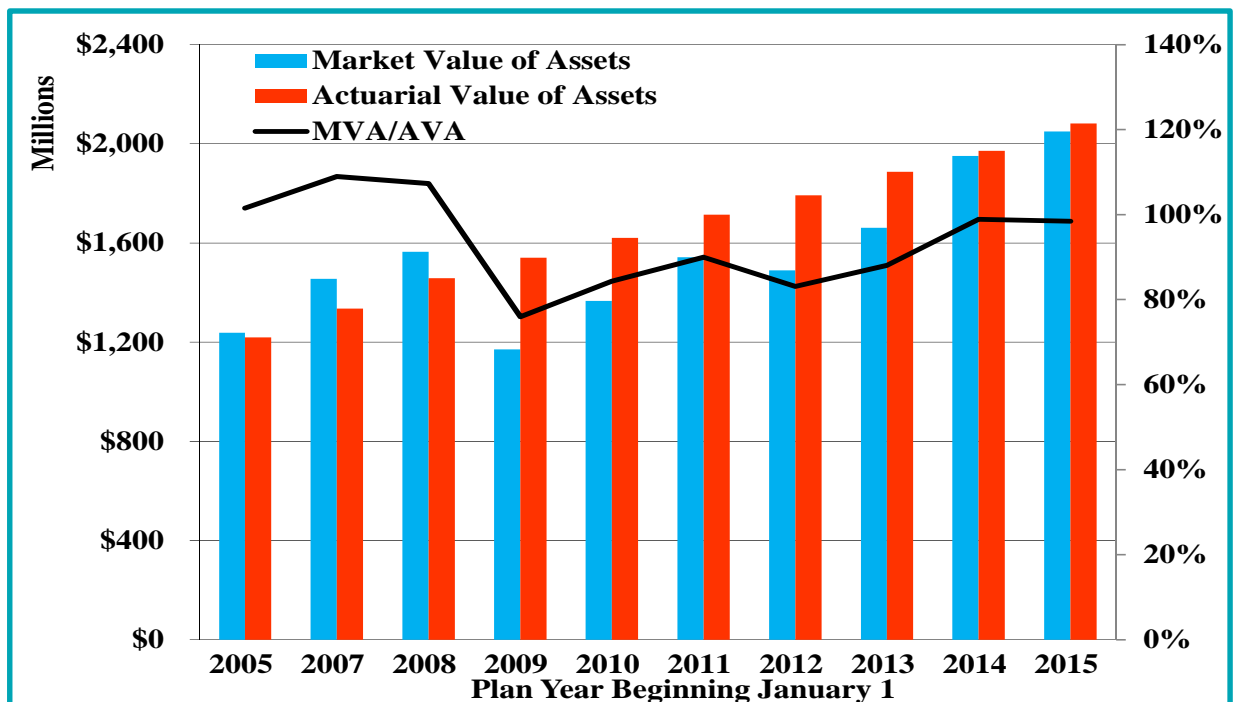


**PENNSYLVANIA MUNICIPAL RETIREMENT SYSTEM  
ACTUARIAL VALUATION AS OF JANUARY 1, 2015**

**SECTION I  
BOARD SUMMARY**

In addition to the historical funded status ranges, another important relationship to review is the Actuarial Value of Assets and Market Value of Assets. The Actuarial Value of Assets is defined as the reserves being held for all benefits of the participating employers. This amount changes annually by the actual cash flows and the regular interest rate for the year. When compared to the Market Value of Assets, any shortfall must be resolved from future investment earnings in excess of the regular interest rate assumption. As a response to the recession and slow recovery as well as a review of the System liabilities, annuity purchase rates, and the long term expected rate of return for the Market Value of Assets, the regular interest rate was reduced by the Pennsylvania Municipal Retirement Board in 2013 from 6.0% to 5.5%. In part, this reduction was intended to help return the System to the pre-recession levels when the Market Value of Assets exceeded Actuarial Value of Assets. Based upon analysis provided to the Board, this regular interest rate is supported by the trend that liabilities associated with retirees continues to grow as a percentage of the entire system-wide liabilities as if annuities were purchased for those participants based upon rates published by the Pension Benefit Guaranty Corporation which were used as a proxy for the estimated cost if annuities were purchased at retirement. The regular interest rate was selected for funding purposes. The liabilities presented within this report are not intended to represent the cost of settling plan liabilities through either the purchase of annuities or lump sum payments.

On a Market Value of Assets basis, the dollar weighted returns for 2013 and 2014 were 18.8% and 5.2%, respectively. However, the Market Value of Assets is still less than the Actuarial Value of Assets by \$31.8 million. Until this difference is made up, there will be no potential excess interest. The following table shows the historic relationship between the Market Value of Assets (MVA; blue bars) and the Actuarial Value of Assets (AVA; red bars) along with the ratio of the MVA to the AVA (represented by the line associated with the right vertical axis) demonstrating the underlying risk of the System. This ratio is at its highest point since 2007.



**PENNSYLVANIA MUNICIPAL RETIREMENT SYSTEM  
ACTUARIAL VALUATION AS OF JANUARY 1, 2015**

**SECTION I  
BOARD SUMMARY**

**B. Current Financial Condition**

On the following pages, we summarize the key results of the January 1, 2015 valuation and how they compare to the results from the January 1, 2014 valuation. While the counts as of January 1, 2014 are based upon the actual data provided by PMRS as of this date, the liabilities for the defined benefit plans of the municipalities were rolled forward from January 1, 2013 to January 1, 2014.

1. System Membership:

As shown in Table I-1 below, total membership in the Retirement System increased by 0.5% from 2014 to 2015. The active participant counts reported for the Traditional Defined Benefit Plans decreased by 1.3% while the active cash balance plan participation increased showing a slow but increasing interest in the hybrid plan approach over the traditional defined benefit.

<b>Table I-1 Membership Total</b>			
	<b>January 1, 2015</b>	<b>January 1, 2014</b>	<b>% Change</b>
Traditional Defined Benefit Actives	7,580	7,676	-1.3%
Cash Balance Benefit Actives	1,214	1,185	2.4%
Terminated Vesteds	1,027	1,044	-1.6%
Participants Receiving Benefit Payments	4,566	4,423	3.2%
Inactive Nonvested Participants with accounts	8	14	
Beneficiaries	542	520	4.2%
Total System Members	14,937	14,862	0.5%
Annual Salaries*	\$431,808,006	\$434,603,924	-0.6%
Average Salary per Active Member	\$49,103	\$49,047	0.1%

\* Annualized salary for Traditional Defined Benefit plan participants and actual salary for cash balance participants

**PENNSYLVANIA MUNICIPAL RETIREMENT SYSTEM  
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**SECTION I  
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Table I-2 is a summary of the demographic make-up of the traditional defined benefit and cash balance plans in the System.

Table I-2 Demographic Make-up of the System				
Category	Valuation as of		Percent Change	
	January 1, 2015	January 1, 2014		
Number of plans:				
Traditional Defined Benefit Plans	721	716	0.70%	
Cash Balance Plans	<u>286</u>	<u>268</u>	6.72%	
Total	1,007	984	2.34%	
Active Employees in Traditional Defined Benefit Plans:				
Count	7,580	7,676	-1.25%	
Average Age	48.3	48.3	-0.06%	
Average Service	12.8	12.8	-0.55%	
Total Payroll*	\$ 384,270,155	\$ 389,410,214	-1.32%	
Average Pay	\$ 50,695	\$ 50,731	-0.07%	
Active Employees in Cash Balance Plans:				
Count	1,214	1,185	2.45%	
Average Age	51.0	50.7	0.69%	
Average Service	12.6	12.4	1.37%	
Total Payroll*	\$ 47,537,851	\$ 45,193,710	5.19%	
Average Pay*	\$ 39,158	\$ 38,138	2.67%	
Total Active PMRS Participants	8,794	8,861	-0.76%	
Inactive Nonvested Participants with account balances:	8	14	-42.86%	
Deferred Vested Participants:				
Traditional Defined Benefit Plans	779	753	3.45%	
Cash Balance Plans	248	291	-14.78%	
Pensioners:				
Count	4,566	4,423	3.23%	
Average Age	69.6	69.4	0.29%	
Average Monthly Benefit	\$ 1,279	\$ 1,252	2.14%	
Number of New Awards	392	431	-9.05%	
Average New Monthly Benefit	\$ 1,492	\$ 1,706	-12.52%	
Number Receiving Legislated COLA	220	193	13.99%	
Survivor Beneficiaries:				
Count	542	520	4.23%	
Average Age	74.8	74.6	0.28%	
Average Monthly Benefit	\$ 902	\$ 771	17.09%	
Total Inactive Participants Count	6,143	6,001	2.37%	

\*Annualized salaries paid during the prior plan year.

**PENNSYLVANIA MUNICIPAL RETIREMENT SYSTEM  
ACTUARIAL VALUATION AS OF JANUARY 1, 2015**

**SECTION I  
BOARD SUMMARY**

2. System Assets and Liabilities:

Table I-3 presents a comparison between the January 1, 2014 and January 1, 2015 System assets, liabilities, unfunded actuarial liability, and funding ratios for traditional defined benefit non-county, traditional defined benefit county, and non-county cash balance plans. While this valuation was prepared to support the municipal plans, we have *rolled forward* county participant active and vested terminated liabilities from the 2014 valuation. Retiree liabilities were explicitly valued. Liabilities for the non-county cash balance plans are based on the member and municipal accounts, as provided by PMRS, and the explicit retiree liabilities.

On an Actuarial Value of Asset basis, the total funding ratio increased from 98.4% as of January 1, 2014 to 100.7% as of January 1, 2015. On a Market Value of Asset basis the increase in the funding ratio is driven primarily by the additional pension obligation bond contribution of \$27.4 million for one participating municipality. This overall funding ratio increased from 97.3% to 99.2%, but without reflecting the pension obligation bond, this funding ratio would be 97.8%.

**PENNSYLVANIA MUNICIPAL RETIREMENT SYSTEM  
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**SECTION I  
BOARD SUMMARY**

Table I-3 Total Plan Assets and Liabilities (\$ thousands)			
	January 1, 2015	January 1, 2014	% Change to Baseline
<b>Traditional Defined Benefit (Non-county) Plans:</b>			
Actives	\$ 992,752	\$ 997,992	-0.5%
Terminated Vesteds	72,718	56,837	27.9%
In Pay Status	790,439	752,243	5.1%
Total Actuarial Liability <sup>1</sup>	\$ 1,855,909	\$ 1,807,072	2.7%
Actuarial Value of Assets <sup>2</sup>	1,870,425	1,787,947	4.6%
Unfunded/(Surplus) of Actuarial Liability	\$ (14,516)	\$ 19,125	
<b>Traditional Defined Benefit (County) Plans:</b>			
Actives	\$ 64,394	\$ 60,238	6.9%
Terminated Vesteds	9,240	8,554	8.0%
In Pay Status	36,145	35,797	1.0%
Total Actuarial Liability <sup>1</sup>	\$ 109,779	\$ 104,589	5.0%
Actuarial Value of Assets <sup>2</sup>	107,677	102,364	5.2%
Unfunded/(Surplus) of Actuarial Liability	\$ 2,102	\$ 2,225	
<b>Cash Balance Plans:</b>			
Actives	\$ 71,738	\$ 65,489	9.5%
Terminated Vesteds	11,549	11,720	-1.5%
In Pay Status	18,290	16,352	11.9%
Total Actuarial Liability	\$ 101,577	\$ 93,561	8.6%
Actuarial Value of Assets <sup>2</sup>	101,577	93,561	8.6%
Unfunded/(Surplus) of Actuarial Liability	\$ 0	\$ 0	
<b>Total of All Plans</b>			
Actives	\$ 1,128,884	\$ 1,123,719	0.5%
Terminated Vesteds	93,507	77,111	21.3%
In Pay Status	844,874	804,392	5.0%
Total Actuarial Liability	\$ 2,067,265	\$ 2,005,222	3.1%
Market Value of Assets	\$ 2,049,615	\$ 1,951,247	5.0%
Actuarial Value of Assets (summation of above) <sup>2</sup>	\$ 2,079,679	\$ 1,983,872	4.8%
Expenses in Excess of Assessment	4,102	3,412	20.2%
Actuarial Value of Asset Adjustment <sup>3</sup>	(2,341)	(15,010)	-84.4%
Final Actuarial Value of Assets <sup>4</sup>	\$ 2,081,440	\$ 1,972,274	5.5%
<b>Unfunded/(Surplus) using Actuarial Value</b>	<b>\$ (14,175)</b>	<b>\$ 32,948</b>	<b>-143.0%</b>
<b>Funding Ratio on Actuarial Asset Value</b>	<b>100.7%</b>	<b>98.4%</b>	<b>2.3%</b>
<b>Unfunded/(Surplus) using Market Asset Value</b>	<b>\$ 17,650</b>	<b>\$ 53,975</b>	<b>-67.3%</b>
<b>Funding Ratio on Market Asset Value</b>	<b>99.2%</b>	<b>97.3%</b>	<b>1.8%</b>

1 County plan liabilities are estimated in odd years and municipal defined benefit liabilities are estimated in even years based upon a roll-forward of the prior year's liabilities.

2 The assets shown above are attributable to the traditional defined benefit, cash balance, non-county and county plans based upon updated data and information provided.

3 The actuarial value of asset adjustment reflects the total difference between the retiree reserve and the retiree liabilities as well as differences from plans entering and exiting the System as of plan year end.

4 The final Actuarial Value of Assets reflect the asset value based primarily upon member, municipal, retiree, disability & DROP reserve accounts as approved by the Board and provided by PMRS in the 2013 and 2014 CAFR.

**PENNSYLVANIA MUNICIPAL RETIREMENT SYSTEM  
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**SECTION I  
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Table I-4 presents a summary of the January 1, 2015 municipal traditional defined benefit plans that are in a surplus or underfunded position.

<b>Table I-4</b>		
<b>Funded Status of Municipalities</b>		
	<b>January 1, 2015</b>	<b>January 1, 2013</b>
<b>A. Municipal Plans in a surplus position</b>		
1. Number of plans with a surplus	364	355
2. Actuarial Value of Assets in plans with a surplus	\$706,681,600	\$707,387,743
3. Actuarial Liability in plans with a surplus	<u>596,027,513</u>	<u>592,489,200</u>
4. Amount of surplus (2. – 3.)	\$110,654,087	\$114,898,543
<b>B. Municipal Plans in an underfunded position</b>		
1. Number of underfunded plans	353	355
2. Actuarial Value of Assets in underfunded plans	\$1,163,743,859	\$1,014,902,374
3. Actuarial Liability in underfunded plans	<u>1,259,881,712</u>	<u>1,134,159,207</u>
4. Amount of (unfunded) liability (2. – 3.)	(\$96,137,853)	(\$119,256,833)

**PENNSYLVANIA MUNICIPAL RETIREMENT SYSTEM  
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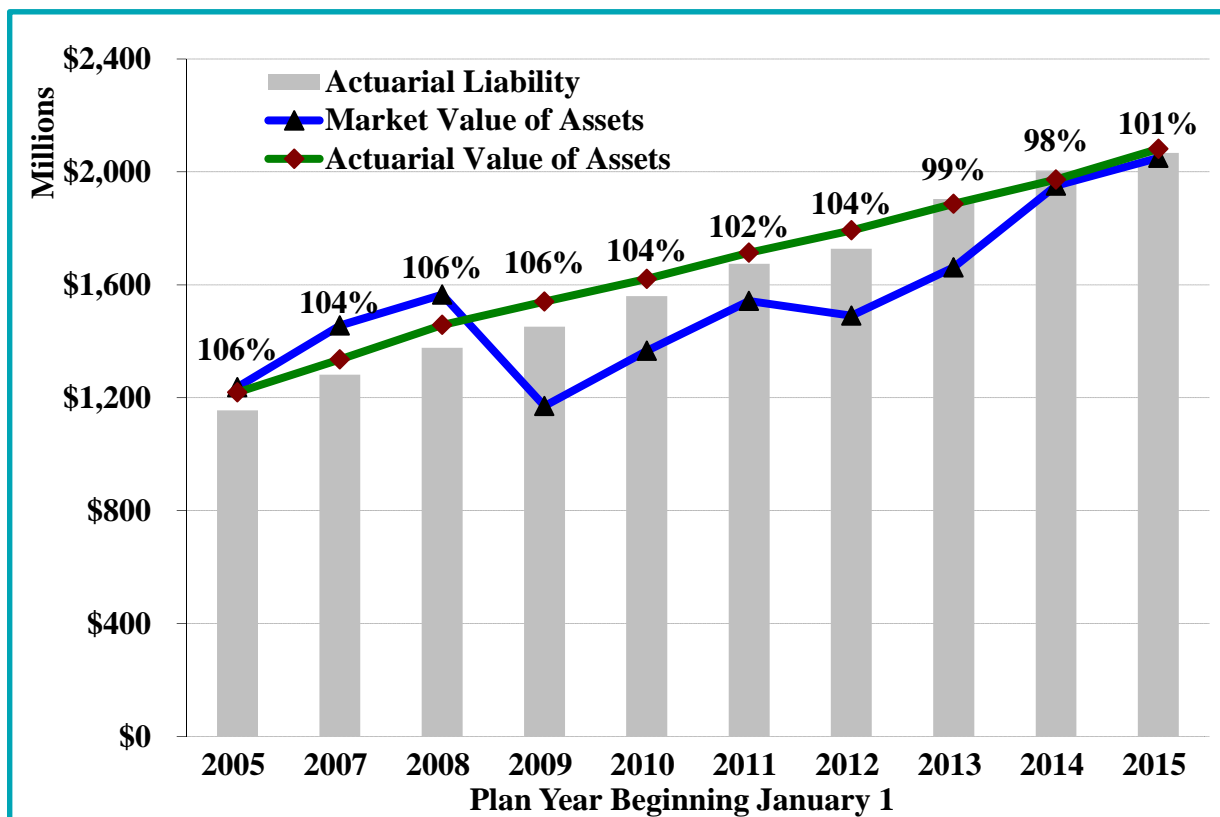
**SECTION I  
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**C. Historical Trends**

Even though the attention given to the valuation reflects the most recently computed actuarial liability and funding ratio, it is important to remember that each valuation is merely a snapshot of the long-term progress of the System. It is equally important to judge a current year’s valuation result relative to historical trends, as well as trends expected into the future.

In the chart below, we present the historical trends for the total System (traditional defined benefit, cash balance, county and non-county) market and actuarial value of assets compared to the total System (traditional defined benefit, cash balance, county and non-county) actuarial liabilities. We have included the funding ratio (Actuarial Value of Assets divided by the Actuarial Liability) across the top of each bar to show the progress of the System since 2005.

**Pennsylvania Municipal Retirement System Assets and Liabilities – 2005 to 2015**

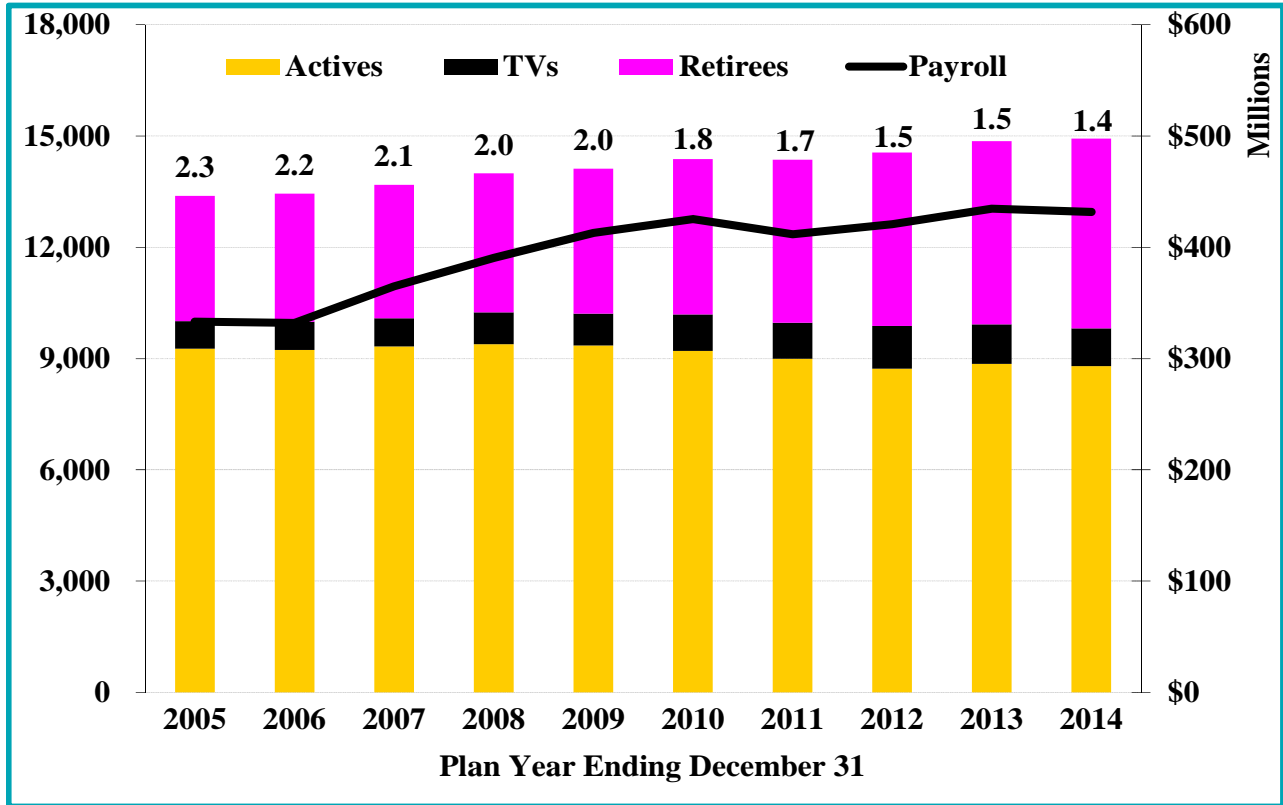


In 2013, the discount rate assumption decreased from 6.0% to 5.5%, causing a larger increase in liabilities (the gray bars) than otherwise expected. This was the first year in the 10-year history that the System’s Actuarial Liabilities were larger than the Actuarial Value of Assets. As of this valuation, the individual municipal reserves that make up the Actuarial Value of Assets are once again larger than the Actuarial Liability. However, the funded ratio on a Market Value of Assets basis is important to understand the underlying System’s risks. The 2015 Market Value of Assets is just slightly less than the Actuarial Liability, such that on a market value basis, the funded ratio would be 99.2% bolstered by the one-time bond payment of \$27.4 million.

**PENNSYLVANIA MUNICIPAL RETIREMENT SYSTEM  
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**SECTION I  
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**Pennsylvania Municipal Retirement System Participant Counts – end of year 2005 to 2014**



The chart above shows a comparison of the demographic makeup of the System over the last ten years. The number above the bars represents the ratio of active to inactive participants which is decreasing steadily. A retirement system has a life cycle, reaching maturity when as many or more of the covered participants are non-active (retirees and terminated vested participants). When this occurs, the ratio moves closer to and sometimes below 1.0. For the System, the fact that this ratio has declined steadily over the past ten years indicates that the System is maturing. The nature of the risk factors of a maturing fund is such that investment recovery takes more time and can be difficult to achieve without additional steps like further reduction in the interest rates. Prolonged recovery is primarily due to an increasing net negative cash flows (occurring when benefit payments and expenses exceed contributions) and reduced active participation which is a significant source of contributions.



**PENNSYLVANIA MUNICIPAL RETIREMENT SYSTEM  
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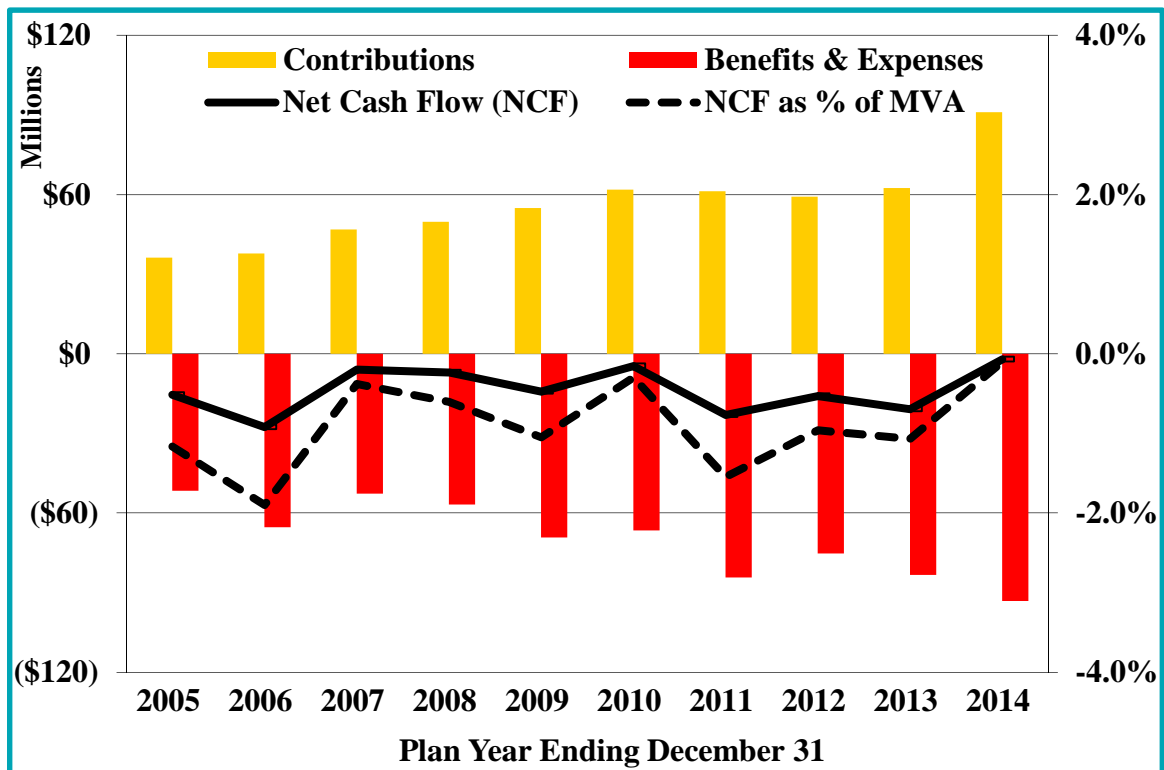
**SECTION I  
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This next graph tracks the cash flow since 2005. An important risk element of a retirement system is the implication of cash flow and resources for paying benefits. If the level of benefit payments plus expenses exceeds expected contributions, the additional cash from existing assets are needed to make the benefit payments. This is referred to as negative cash flow which is typical among retirement systems where the number of retirees increase steadily compared to the number of active participants. The dashed black line (which corresponds to the right-hand axis) provides the net cash flow as a percent of the Market Value of Assets (MVA). As the graph below illustrates, the negative net cash flow falls within the range of 0.1% to 2.0% of total assets, with the average of negative 0.9%. This implies that along with proceeds from contributions, an additional amount of cash generated from asset investments must be used to pay benefits. Another way to consider this is that for the total value of assets to grow, the fund needs a minimum return equal to the net negative cash flow.

The System’s net cash flow as a percent of Market Value of Assets of -0.1% is at its most favorable point over the last 10 years but primarily due to a one-time payment of \$27.4 million from an individual municipality to pay down their unfunded liability. Absent this contribution, the net cash flow for the year would have been -1.4% of Market Value of Assets.

The volatility of the net cash flow is not only a function of contributions and benefit payments, but also reflects transfer of funds into the System from new participating municipalities and asset outflows to municipalities that choose to leave the System.

**Pennsylvania Municipal Retirement System Cash Flows – 2005 through 2014**



**PENNSYLVANIA MUNICIPAL RETIREMENT SYSTEM  
ACTUARIAL VALUATION AS OF JANUARY 1, 2015**

**SECTION I  
BOARD SUMMARY**

**D. Projected Financial Trends**

Our analysis of the Pennsylvania Municipal Retirement System's projected financial trends is an important part of this valuation. In this section, we present our assessment of the implications of the January 1, 2015 valuation results on the future outlook in terms of benefit security (assets sufficient to cover liabilities) and the System's expected funding progression.

In the charts that follow, we project the Retirement System's resources and obligations. We assume the Act 205 contributions are made each year. The projections are provided under four different assumptions:

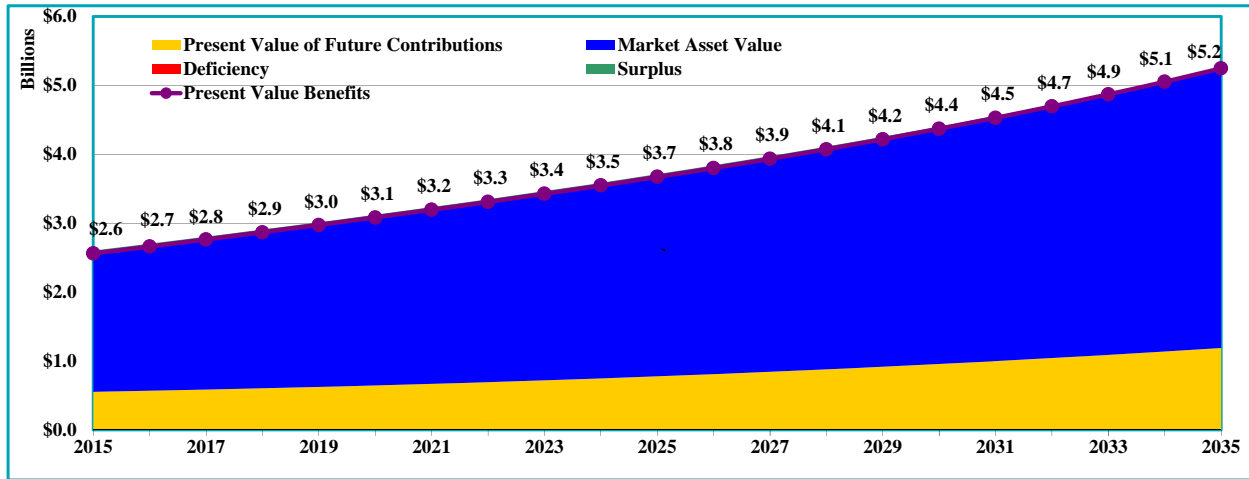
- 1) Assuming 5.50% investment returns each and every year,
- 2) Assuming 7.50% investment returns each and every year,
- 3) Assuming average investment returns over 20 years equals 5.50% but vary annually based on the returns provided in Table I-5. We do this to demonstrate a more realistic projection because the System's return will never be level from year to year,
- 4) Assuming 20 years of varied returns equal to an overall average 7.50% investment return based on Table I-6.

The projections that follow show how the total obligations of the System, assuming the current active population, consistently increase (shown by the purple line). This is an open group projection which means when an active participant is expected to change status, they are assumed to be replaced. The area under the purple line represents the *Present Value of Benefits*. This amount takes into account the value of all benefits earned up to that point in time (Actuarial Liability) plus benefits assumed to be earned into the future. This amount represents the System's total obligation over time.

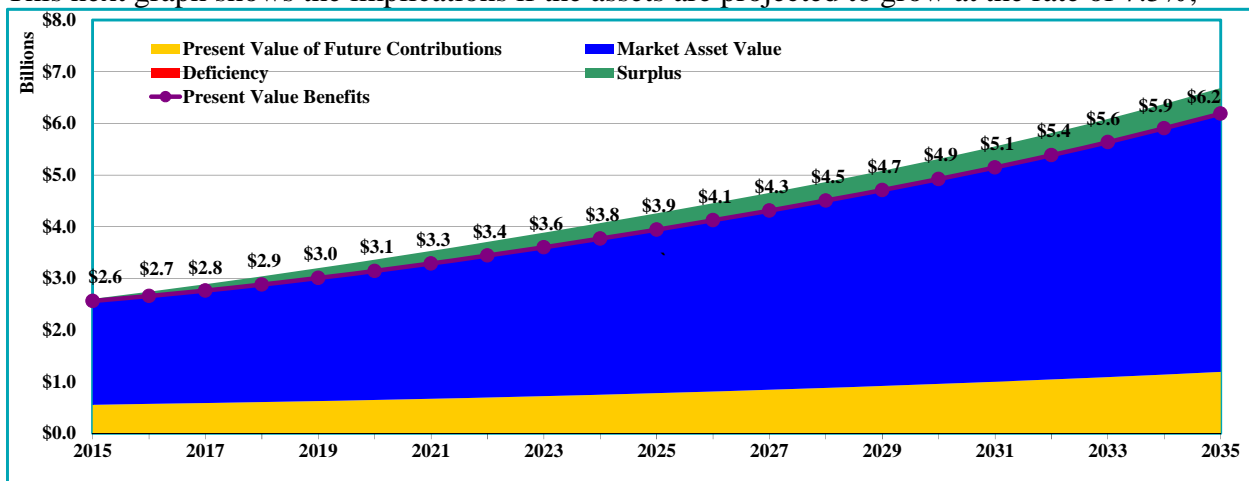
To meet these obligations, the System has resources which include the Market Value of Assets (in blue) and the present value of future contributions (in gold). To the extent these two sources are insufficient to meet the obligations today or in the future, the result will be a deficit (in red). If the System's resources exceed the obligations, the result will be a surplus (green). For this System, given that the investment regular interest rate for all municipalities is currently at 5.5%, the only resource to cover a deficit or create a surplus is through average future investment returns at a System level that exceed the 5.5% rate. Under the following projection, the assets track very closely with the System's obligations throughout the projection. This occurs primarily due to the System's near full-funding as of the valuation date and the expectation that if all actuarial assumptions are achieved, the assets and obligations will grow consistently.

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This next graph shows the implications if the assets are projected to grow at the rate of 7.5%,



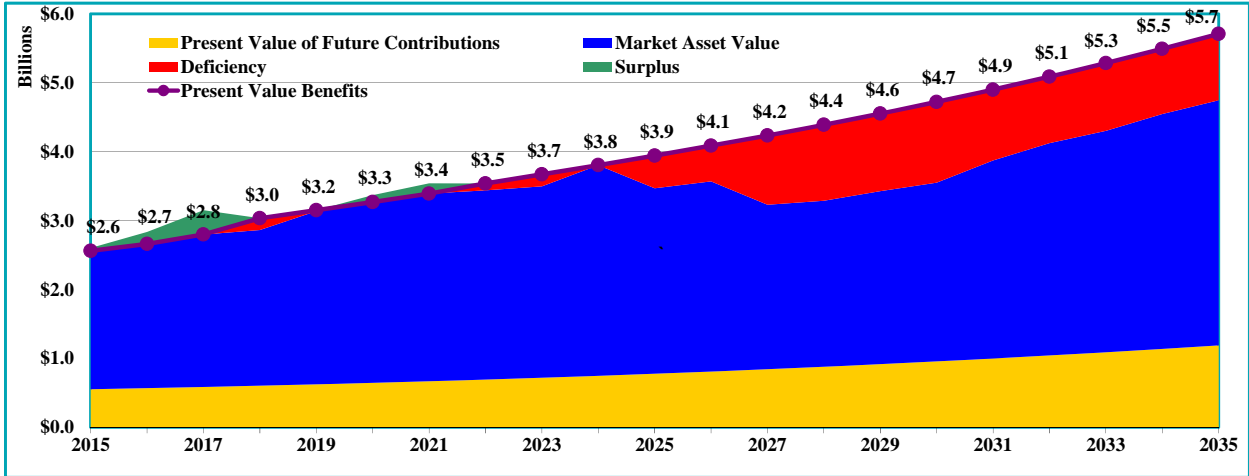
The surplus, shown by the green area in the second chart, displays the assets outpacing the obligations over the 20 year projection because the annual investment return is 200 basis points larger. In addition, the projected present value of benefits increases under this scenario because excess interest is assumed to occur and increase benefits offered under individual pension plans. If in fact excess interest is distributed, use of excess interest may be limited based upon Pennsylvania Municipal Retirement Law until an individual municipality’s funded status is at least 95% funded.

The System’s return on assets each year will not equal 5.5% but will, over time, have a high likelihood of achieving a higher rate of return based on analysis provided by the investment consultant. Based on the hypothetical future return rates in Table I-5 on the next page, which yield an average 5.5% rate of return over the projection period, the projected funded status will show higher and lower levels of funding based upon the market value of assets.

**PENNSYLVANIA MUNICIPAL RETIREMENT SYSTEM  
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Table I-5 Projected Returns Equal to the Valuation Rate										
Fiscal Year	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Return	12.00%	15.00%	-10.00%	14.00%	11.00%	8.00%	-2.00%	4.00%	14.00%	-10.00%
Fiscal Year	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Return	6.00%	-10.50%	4.00%	7.50%	6.50%	14.00%	10.00%	7.00%	8.75%	6.90%



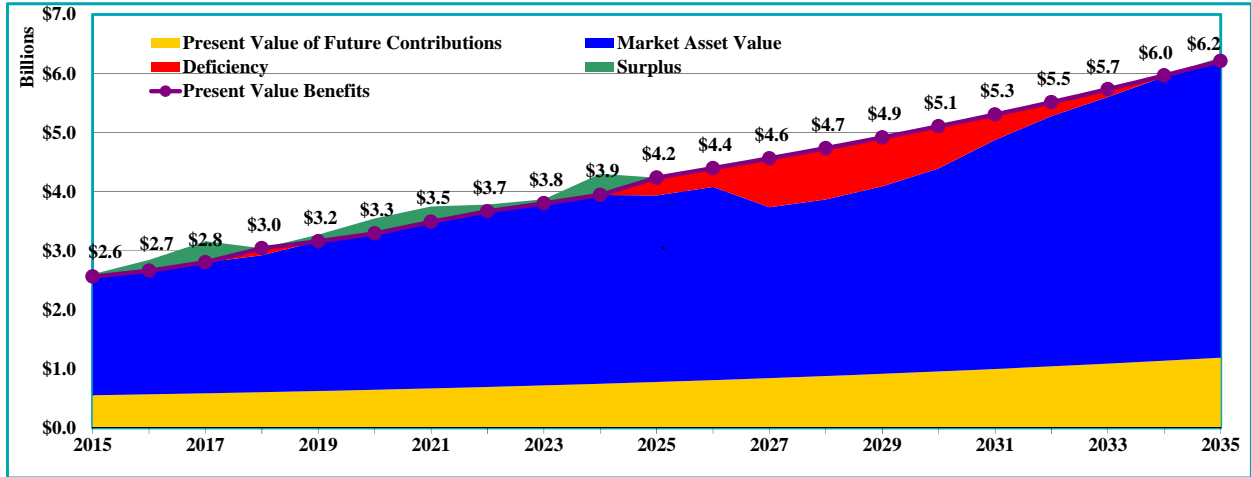
Based on this illustration, there is potential for the System to have funding level improvement which reflects some of the real expectations for future returns. However, without returns averaging in excess of 5.5%, the fund will fluctuate from positions of surplus and deficit due to market volatility, anticipated negative cash flows, and additional liabilities paid to participants in the form of excess interest based on Board policy and final approval. This illustrates that there are still risks of material underfunding even if the System return rate of 5.5% is met

The potential volatility is equally apparent when we project investment returns that vary but now are expected to produce an average return over time of 7.5% as summarized in Table I-6. The fund could come out of deficit position at the end of the period.

Table I-6 Projected Returns Equal to 7.5%										
Fiscal Year	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Return	12.50%	15.00%	-8.00%	17.00%	12.00%	9.00%	3.00%	5.00%	16.00%	-8.00%
Fiscal Year	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Return	7.50%	-8.00%	7.00%	10.00%	12.00%	16.00%	12.00%	9.00%	9.00%	7.50%

**PENNSYLVANIA MUNICIPAL RETIREMENT SYSTEM  
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**PENNSYLVANIA MUNICIPAL RETIREMENT SYSTEM  
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**SECTION II  
ASSETS**

The System’s assets play a key role in the financial operation and in the decisions the Board may make with respect to future deployments. The level of assets, the allocation of assets among asset classes, and the methodology used to measure assets can impact benefit levels, Municipal and County contributions, and the ultimate security of participants’ benefits.

In this section, we present detailed information on total (county & non-county) System assets including:

- **Disclosure** of System assets at December 31, 2014 and December 31, 2013;
- Statement of the **changes** in market values during the year;
- Development of the **actuarial value of assets**; and
- Allocation of **excess interest**.

**Disclosure**

The market value of assets represents a “snap-shot” or “cash-out” value, which provides the principal basis for measuring financial performance from one year to the next. Market values, however, can fluctuate widely with corresponding swings in the marketplace.

The actuarial values are a reflection of the market values and the aggregate reserves being credited to each participating employer. They are used for evaluating the System’s ongoing liability to meet its obligations to pay benefits when due.

Table II-1 summarizes at the market value of assets by asset class.

<b>Table II-1</b>				
<b>Statement of Assets at Market Value December 31 (\$ Thousands)</b>				
	<b>2014</b>		<b>2013</b>	
<b>Assets</b>				
Equity Investments	\$	1,360,818	\$	1,331,140
Accounts Receivable		4,648		4,495
Fixed Income Investments		360,287		326,179
Real Estate Investments		328,359		294,355
Fixed Assets		134		145
Accounts Payable		(2,749)		(2,316)
Investment Purchases Payable		(1,882)		(2,751)
<b>Total Market Value of Assets</b>	<b>\$</b>	<b>2,049,615</b>	<b>\$</b>	<b>1,951,247</b>

**PENNSYLVANIA MUNICIPAL RETIREMENT SYSTEM  
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**SECTION II  
ASSETS**

Table II-2 summarizes the transaction of the assets during the year leading up to our valuation.

<b>Table II-2</b>		
<b>Changes in Market Value in (\$ Thousands)</b>		
<b>Market Value of Assets – January 1, 2014</b>		<b>\$ 1,951,247</b>
<b><u>Additions</u></b>		
Contributions:		
Plan Members	\$ 22,782	
Municipal Employers	67,972	
Assessments	309	
<b>Total Contributions</b>		<b>\$ 91,063</b>
Investment Income:		
Net Appreciation In Fair Value Of Investments	\$ 73,175	
Short-Term And Other Investments	104	
Common And Preferred Stock	9,739	
Real Estate Equity	20,529	
International Equities	4,770	
Miscellaneous Income	0	
Less Investment Expenses	(7,863)	
<b>Net Investment Income</b>		<b>\$ 100,454</b>
<b>Total Additions</b>		<b>\$ 191,517</b>
<b><u>Deductions</u></b>		
Annuity Benefits	\$ (78,433)	
Terminations	(10,305)	
Administrative Expenses	(4,411)	
<b>Total Deductions</b>		<b>\$ (93,149)</b>
<b>Market Value of Assets – January 1, 2015</b>		<b>\$ 2,049,615</b>

From Table II-2 it is important to recognize that benefit payouts plus expenses of \$93.1 million exceeds contribution income of \$91.1 million for a net negative cash flow of \$2.0 million, which is approximately 0.1% of the Market Value of Assets. A single plan made a one-time contribution of \$27.4 million during the year to reduce their unfunded liability. Without this contribution, the net negative cash flow is approximately 1.4% of the Market Value of Assets.

**PENNSYLVANIA MUNICIPAL RETIREMENT SYSTEM  
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**SECTION II  
ASSETS**

**Actuarial Value of Assets**

The Actuarial Value of Assets is based on the individual municipal account balances maintained by PMRS, also referred to as reserves.

This asset valuation method also takes into account the calculation of *excess interest* which is derived from income in excess of the long-term investment return assumption and when the Market Value of Assets exceed the Actuarial Value of Assets. The steps in the determination of the Actuarial Value of Assets as of December 31, 2014 are shown below. When the Market Value of Assets exceeds the Actuarial Value of Assets there is a surplus. However, the Market Value of Assets is less than the reserves by \$31.8 million as of December 31, 2014. This deficit represents 1.6% of the Market Value of Assets which is comparable to 1.1% as of December 31, 2013. Based on the funding structure of the System, it is currently anticipated that this difference will be made up by future investment returns in excess of the long-term crediting assumption of 5.5%.

<b>Table II-3 Development of Actuarial Value of Assets (\$ Thousands)</b>	
1. Prior Year Actuarial Value:	\$ 1,972,274
2. Total Audited Reserve Accounts:	\$ 2,077,338
3. Expected Administrative Expenses:	<u>4,102</u>
4. Preliminary Actuarial Value (2. + 3.):	\$ 2,081,440
5. Current Year Market Value of Assets:	2,049,615
6. Prior Year Market Value of Assets:	1,951,247
7. New Surplus {Minimum of [(5. - 4.) & (5. - 4.) - (6. - 1.)]}:	(31,825)
8. Percentage of New Surplus Credited as Excess Interest: <sup>a</sup>	0.000%
9. Excess Interest (Maximum of 0 and (7. x 8.)) available:	\$ 0
10. Excess Interest awarded	\$ 0
<b>11. Current Year Actuarial Value of Assets (4. + 10.):</b>	<b>\$ 2,081,440</b>

<sup>a</sup> See Table II-4b



**PENNSYLVANIA MUNICIPAL RETIREMENT SYSTEM  
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**SECTION II  
ASSETS**

**Excess Interest Allocation**

Each year, municipalities may be eligible to receive a supplemental allocation of investment monies beyond the regular 5.5% interest rate. This “excess interest” award is derived as a portion of “new surplus” created during the year. “Surplus” refers to the excess of Market Value of Assets over the Actuarial Value of Assets. Once the preliminary actuarial asset value has been determined, a formula is used to determine the new surplus. Depending on the relative size of surplus to market value “margin,” between 10% and 90% of new surplus will be designated as “excess interest.”

For the year ended December 31, 2014, there was no surplus because the Market Value of Assets is less than the Actuarial Value of Assets. The calculation in Table II-4a details the calculation that leads to no excess interest for this year.

<b>Table II-4a</b>	
<b>Determination of Excess Interest (\$ Thousands)</b>	
1. Assets	
a. Market value	\$ 2,049,615
b. Preliminary Actuarial Value	<u>2,081,440</u>
c. Available Surplus (1a. - 1b.)	<b>\$ (31,825)</b>
2. Reserves	
a. Members	\$ 427,736
b. Municipal	814,734
c. Disability	490
d. Retired	833,749
e. DROP Participant Reserve Account	<u>629</u>
f. Total (2a. + 2b. + 2c. + 2d. + 2e.)	<b>\$ 2,077,338</b>
3. Last year's surplus	\$ 0
4. New surplus (1c. - 3.)	\$ (31,825)
5. Excess percent of New Surplus (see Table II-4b)	0.000%
6. Excess Interest Awarded	\$ 0
7. Percent of reserve {6. / (2f. - 2c.)}	0.00%
8. Trial Surplus (1c. - 6.)	\$ (31,825)
9. Trial margin percent (8. / 1a.)	0.00%

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**SECTION II  
ASSETS**

<b>Table II-4b Determination of Excess Percent of New Surplus (\$ Thousands)</b>	
1. Market Value of Assets	\$ 2,049,615
2. Available Surplus	\$ 0
3. Margin (2. / 1.)	0.00%
4. New Surplus	\$ 0
5. New Margin (4. / 1.)	0.00%
6. Excess Percent (10% + 800% x 3.) / (100% + 800% x 5.)	0.00%

As of the valuation date, the System has a net deficit. Therefore, no excess interest is awarded to participating municipalities and counties.

**PENNSYLVANIA MUNICIPAL RETIREMENT SYSTEM  
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**SECTION III  
LIABILITIES**

**Disclosure**

The present value of all benefits is the measure of the total expected obligations of the System reflecting the expected future benefit accruals of active participants and the payout stream of all benefits. When compared to the Market Value of Assets and present value of future contributions the balance (surplus)/deficit is a measure of the System's risk in providing for these obligations.

The Actuarial Liability is used for funding calculations. The Actuarial Liability is calculated taking the present value of benefits less the present value of future normal costs under the **Entry Age Normal** funding method.

The following table presents the different liability measurements reflecting actual municipal liabilities and a roll-forward of County plan liabilities for the 2015 valuation. The Present Value of Future Contributions is based upon the Present Value of Future Normal Cost and future amortization of unfunded/(surplus) as of the January 1, 2015 valuation for the municipal defined benefit plans. This information for the County plans is based upon the prior year valuation results rolled forward one year.

<b>Table III-1</b>		
<b>Obligation Deficit/(Surplus) Analysis of All PMRS Plans</b>		
	<b>January 1, 2015</b>	<b>January 1, 2014</b>
<b><u>Present Value of All Benefits - Total Obligation</u></b>		
Active Participant Benefits	\$ 1,622,496,125	\$ 1,607,548,049
Retiree and Inactive Benefits	<u>938,380,471</u>	<u>881,502,593</u>
<b>Present Value of Benefits (PVB)</b>	<b>\$ 2,560,876,596</b>	<b>\$ 2,489,050,642</b>
Present Value of Future Contributions	(542,676,819)	(551,265,960)
Municipal Market Value of Assets (MVA)	<u>(2,049,615,132)</u>	<u>(1,951,247,370)</u>
<b>Net (Surplus)/Deficit of Resources to Obligation (PVB + PVFNC + MVA)</b>	<b>\$ (31,415,355)</b>	<b>\$ (13,462,688)</b>
<b><u>Actuarial Liability</u></b>		
Present Value of Benefits (PVB)	\$ 2,560,876,596	\$ 2,489,050,642
Present Value of Future Normal Cost Contributions (PVFNC)	<u>(493,611,746)</u>	<u>(483,828,535)</u>
<b>Actuarial Liability (AL = PVB + PVFNC)</b>	<b>\$ 2,067,264,850</b>	<b>\$ 2,005,222,107</b>
Municipal Actuarial Value of Assets (AVA)	<u>(2,081,439,591)</u>	<u>(1,972,273,674)</u>
<b>Net Unfunded/(Surplus) (AL + AVA)</b>	<b>(\$14,174,741)</b>	<b>\$ 32,948,433</b>

**PENNSYLVANIA MUNICIPAL RETIREMENT SYSTEM  
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**SECTION IV  
CONTRIBUTIONS**

In the process of evaluating the financial condition of any pension plan, the actuary analyzes the assets and liabilities to determine the contributions needed based upon the funding policy established for the plan. Typically, the actuarial process will use a funding technique that will result in a pattern of contributions that are both stable and predictable.

For each of the plans covered by the System, the funding cost method as stipulated by law to be applied in the determination of the liability is the **Entry Age Normal Actuarial Cost Method**. This method is also relevant for accounting standards, as it is an acceptable cost method for GASB 67 and 68. Based upon this cost method, the statutory methods for funding any unfunded liability, there are four components that are used to determine the total contribution: the **normal cost**, the amortization of **initial unfunded actuarial liability**, any subsequent amortizations of **increases/decreases in the unfunded actuarial liability/or adjustment for surplus**, and expenses applied at the rate of \$20 per participant.

The statutory funding method requires that increases/decreases resulting from experience gains or losses by plan get amortized over the lesser of 20 years or the future working life of the active participants. Increases/decreases from assumption changes by the System are amortized over 15 years or the future working life of the active participants. Changes in liabilities as a result of changes in benefits by plan are amortized over 20 years if state mandated, otherwise over 10 years for active employees and 1 year for inactive employees. There are exceptions to some of these rules for plans in differing levels of “distress” as defined by under Act 205.

For plans with a surplus, the contribution rate is the normal cost offset by 10% of the surplus again expressed as a percent of payroll. This report provides an analysis of the aggregate assets and liabilities but not the aggregation of the Minimum Municipal Obligations (MMO) required for each participating municipality covered by the 2015 Act 205 forms for 2017 and 2018 MMO contributions. The combination of underfunded and surplus plans would not necessarily be informative in reviewing the overall funded status of the System.

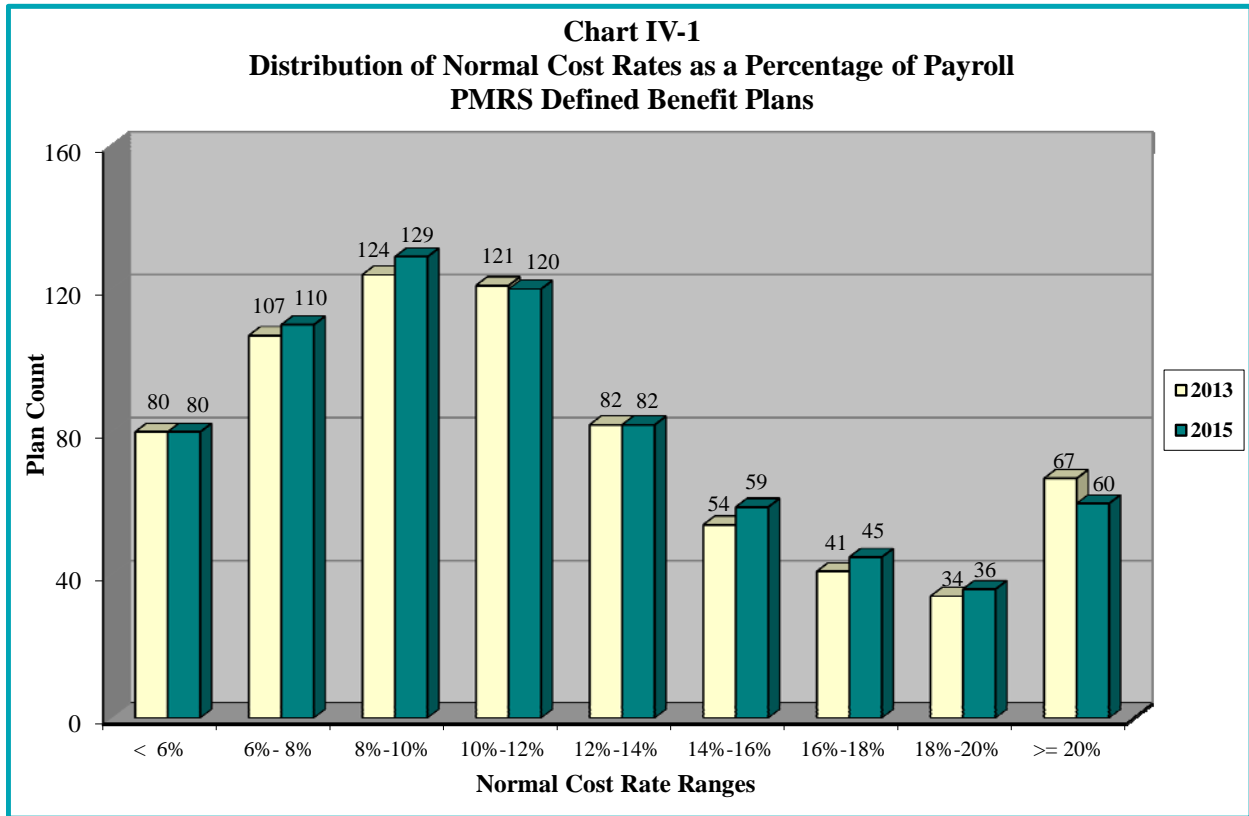
On the following pages, we describe the cost components and provide graphically the distribution of costs among the participating municipalities.

The normal cost rate (i.e., normal cost as a percent of payroll) is determined in the following steps. For a typical new entrant, an individual normal cost rate is determined by taking the present value of future normal costs as of entry age into the plan divided by that member’s present value of expected future salary during their working lifetime. The total normal cost rate is reduced by the member contribution rate to produce the employer normal cost rate. If a plan provides for a Separate Member Annuity through required member contributions, this contribution rate is then added to the total normal cost rate to determine the final total normal cost rate.

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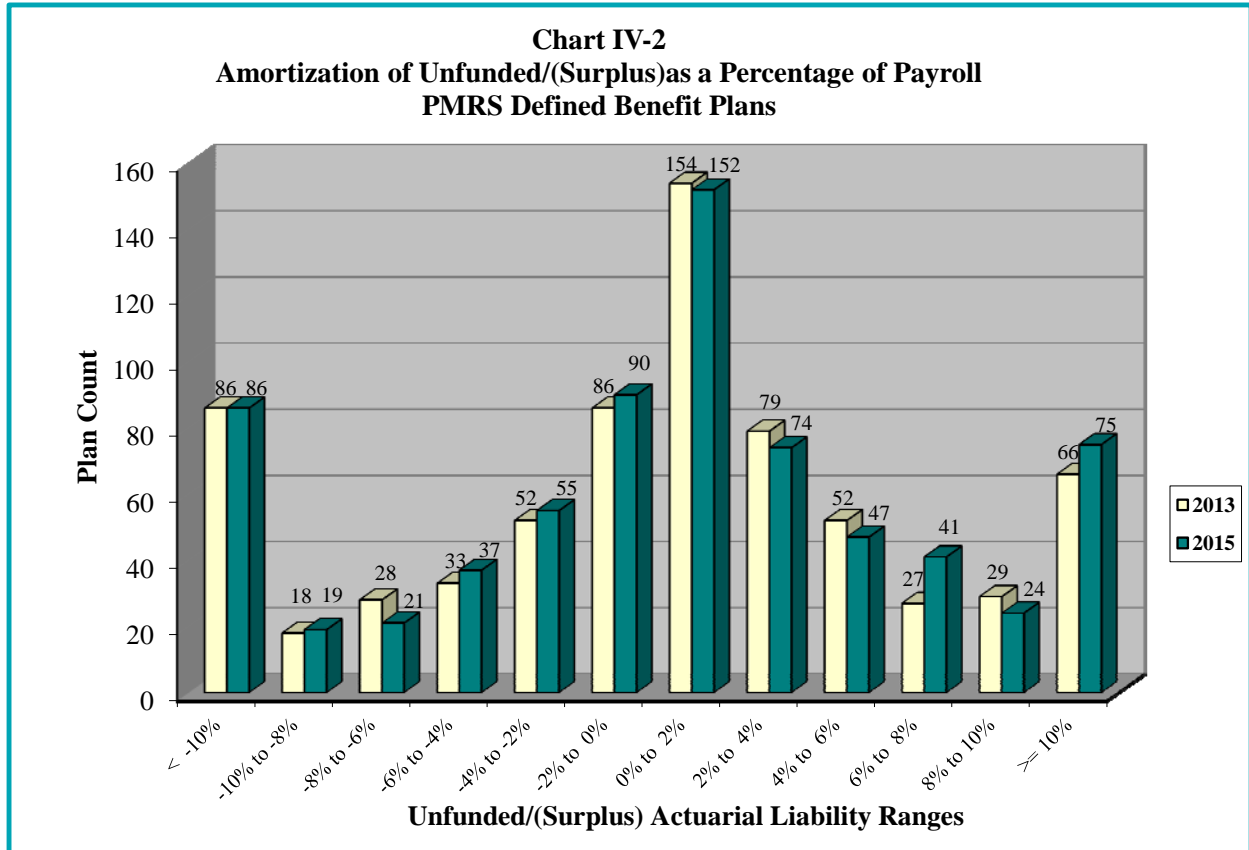
The following chart is a summary of the normal cost rates determined for the traditional defined benefit plans as of January 1, 2013 and January 1, 2015.



**PENNSYLVANIA MUNICIPAL RETIREMENT SYSTEM  
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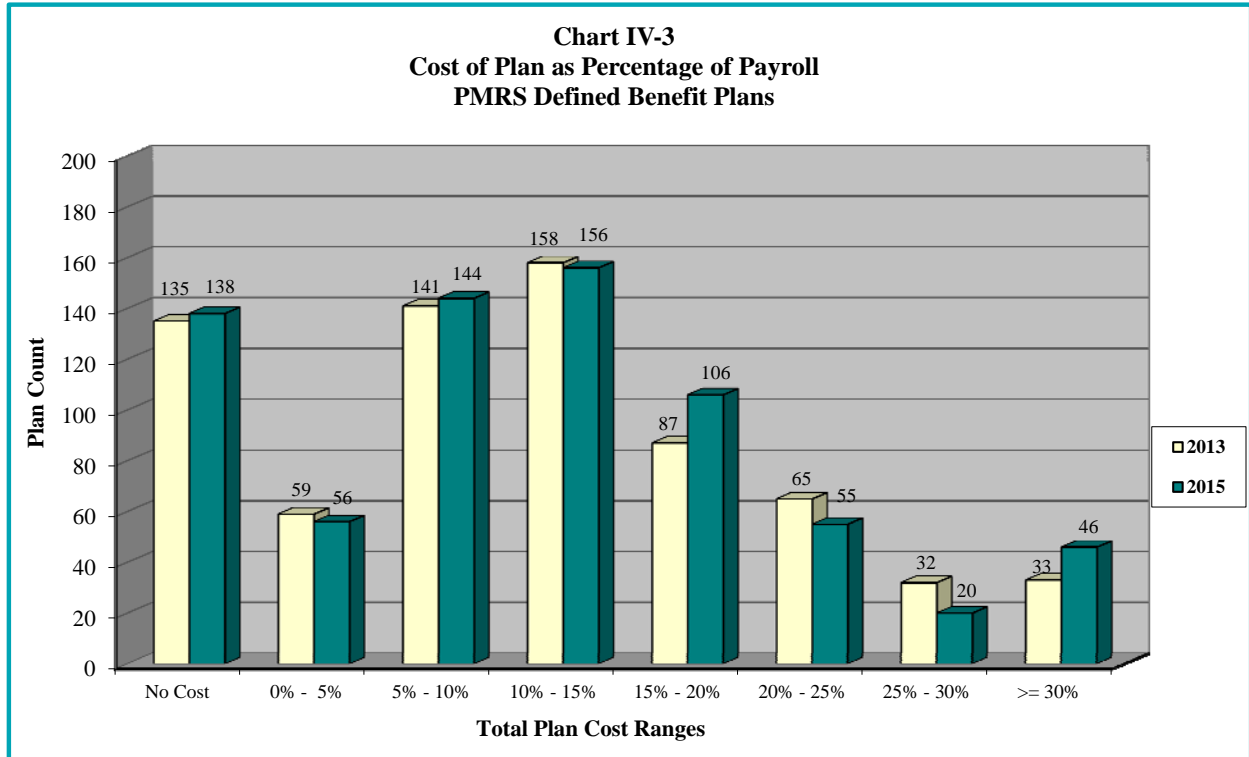
Chart IV-2 below is a summary of the unfunded/(surplus) actuarial liability amortization costs defined as a percent of covered payroll of each plan's active members, determined for the traditional defined benefit plans as of January 1, 2013 and January 1, 2015.



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Chart IV-3 below is a summary of the total costs as a percentage of covered payroll, representing the sum of the normal cost and amortization of unfunded/(surplus) offset determined for the traditional defined benefit plans as of January 1, 2013 and January 1, 2015.



**PENNSYLVANIA MUNICIPAL RETIREMENT SYSTEM  
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**SECTION V  
ACCOUNTING AND FINANCIAL STATEMENT INFORMATION**

GASB Statement No. 25 (GASB 25) established standards for disclosure of pension information by public employee retirement systems and governmental employers in notes to financial statements and supplementary information. GASB Statement No. 67 (GASB 67) replaces GASB 25 effective with valuations after June 30, 2014. The System is defined as an agent multi-employer Plan under GASB 67. The assets of an agent multiple-employer plan are pooled for investment purposes but separate accounts are maintained for each individual participating employer. As a result, each participating employer's share of the pooled assets is legally available to pay the pensions of only its retirees.

The actuarial liability is determined assuming that the System is on-going and participants continue to terminate employment, retire, etc., in accordance with the actuarial assumptions. Liabilities are discounted at the assumed valuation interest rate of 5.50% per annum.

Tables V-1 through V-6 provide the exhibits to be used with the System's Comprehensive Annual Financial Report based upon review of GASB 67 and input from PMRS:

- Table V-1 is the Note to Required Supplementary Information;
- Table V-2 is the Solvency Test which shows the portion of Actuarial Liability covered by Assets;
- Table V-3 is the Funded Status of Actuarial Liabilities;
- Table V-4 is the Schedule of Retirees and Beneficiaries;
- Table V-5 is the Schedule of Total Membership; and
- Table V-6 is the Schedule of Total Membership Funded Status of Actuarial Liabilities.



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**SECTION V  
ACCOUNTING AND FINANCIAL STATEMENT INFORMATION**

**Table V-1  
NOTE TO REQUIRED SUPPLEMENTARY INFORMATION**

The information presented in the required supplementary schedules was determined as part of the actuarial valuation at the date indicated. Additional information as of the latest actuarial valuation follows.

Valuation date	January 1, 2015
Actuarial cost method	Entry Age Normal
Amortization method	Level dollar for Plan Bases and an average for Aggregate Gain/Loss, 10% of surplus is credited against aggregate cost where applicable
Actuarial assumptions:	
Investment rate of return*	5.50%
Projected salary increases*	3.0%-8.3%
*Includes inflation at	3.0%
Cost-of-living adjustments	ad hoc

The actuarial assumptions used have been adopted by the System’s Board based on the System’s experience study completed in 2010.

The rate of employer contributions to the System is composed of the normal cost, amortization of the unfunded actuarial liability and an allowance for administrative expenses. The normal cost is a level percent of payroll cost which, along with member contributions, will pay for projected benefits at retirement for the average plan participant. The actuarial liability is that portion of the present value of projected benefits that will not be paid by future employer normal costs or member contributions. The difference between this liability and the funds accumulated as of the same date is the unfunded actuarial liability. The allowance for administrative expenses is based upon the System’s actual administrative expenses.

**PENNSYLVANIA MUNICIPAL RETIREMENT SYSTEM  
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**SECTION V  
ACCOUNTING AND FINANCIAL STATEMENT INFORMATION**

**Table V-2  
SOLVENCY TEST  
Aggregate Accrued Liabilities for**

Valuation Date January 1,	Active Member Contributions (1)*	Retirees & Beneficiaries (2)	Active Member Employer Financed Contributions (3)	Actuarial Value of Reported Assets	Portion of Accrued Liabilities Covered by Reported Assets		
					(1)	(2)	(3)
2015	\$427,736,008	\$938,380,470	\$701,148,372	\$2,081,439,591	100%	100%	102%
2014	416,472,872	881,502,593	707,246,642	1,972,273,674	100%	100%	95%
2013	418,163,830	812,688,102	672,720,129	1,886,703,664	100%	100%	97%
2012	407,199,633	639,260,852	680,756,784	1,792,809,433	100%	100%	110%
2011	395,048,320	655,645,661	623,210,164	1,713,751,974	100%	100%	106%
2010	348,126,106	589,362,501	622,868,929	1,620,150,779	100%	100%	110%

*\*This includes the sum of the active member employee contribution balances, the member separate annuity account balances, the municipal for member separate annuity account balances, and the excess interest allocations.*

**Table V-3  
Funded Status of Actuarial Liabilities**

Valuation Date January 1,	Actuarial Value of Assets (A)	Actuarial Liability (AL) Entry Age (B)	Unfunded AL (Surplus) (B-A)	Funded Ratio (A/B)
2015	\$2,081,439,591	\$2,067,264,850	\$(14,174,741)	100.7%
2014	1,972,273,674	2,005,222,107	32,948,433	98.4%
2013	1,886,703,664	1,903,572,061	16,868,397	99.1%
2012	1,792,809,433	1,727,217,269	(65,592,164)	103.8%
2011	1,713,751,974	1,673,904,145	(39,847,829)	102.4%
2010	1,620,150,779	1,560,357,536	(59,793,243)	103.8%

The actuarial assumptions as of January 1, 2015 are shown in the assumptions and methods section. The above information was derived from the following membership data, as provided by the System, regarding:

Valuation Date	Valuation of Defined Benefit Liabilities		
	Complete Valuation	Roll-Forward	Cash Balance Plans
January 1, 2015	717	4	286
January 1, 2014	4	712	268
January 1, 2013	710	4	251
January 1, 2012	4	705	240
January 1, 2011	702	5	229
January 1, 2010	5	691	202
January 1, 2009	691	5	203
January 1, 2008	4	688	183

**PENNSYLVANIA MUNICIPAL RETIREMENT SYSTEM  
ACTUARIAL VALUATION AS OF JANUARY 1, 2015**

**SECTION V  
ACCOUNTING AND FINANCIAL STATEMENT INFORMATION**

The table below is a schedule of the changes to the retiree and beneficiary rolls over the last six years.

Valuation Date	Average				Average				Percent Increase in Average Annuities	
	Added to roll	Annual Annuities Added	Annual Benefit Increase	Deleted from roll	Annual Annuities Removed	Number on roll	Annual Annuities	Average Annual Annuities		
January 1, 2015	392	\$17,908	185	227	\$10,494	5,108	\$75,936,364	6.6%	\$14,866	3.1%
2014	431	20,472	430	168	16,043	4,943	71,257,797	9.5%	14,416	3.7%
2013	391	16,440	443	105	8,288	4,680	65,046,544	9.5%	13,899	2.8%
2012	438	16,404	885	228	14,252	4,394	59,411,245	7.5%	13,521	2.4%
2011	396	18,624	432	121	8,981	4,184	55,257,189	13.0%	13,207	5.6%
2010	296	16,030	623	137	9,458	3,909	48,897,954	7.7%	12,509	3.3%

The table below is a summary of the total membership over the last six years.

Valuation Date	Active Members:		Retirees	Beneficiaries	Deferred Pensions	Inactive Members*	Total
	Defined Benefit	Cash Balance					
January 1, 2015	7,580	1,214	4,566	542	1,027	8	14,937
2014	7,676	1,185	4,423	520	1,044	14	14,862
2013	7,599	1,131	4,160	520	1,098	51	14,559
2012	7,836	1,158	3,899	495	952	21	14,361
2011	8,091	1,119	3,707	477	945	42	14,381
2010	8,357	994	3,449	460	834	23	14,117

\* Inactive members represent inactive non-vested participants with employee contribution account balances.

**PENNSYLVANIA MUNICIPAL RETIREMENT SYSTEM  
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**SECTION V  
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The table below is a schedule of the total membership over the last four years.

<b>Table V-6 Schedule of Total Membership Funded Status of Actuarial Liabilities</b>				
	<b>2015</b>	<b>As of January 1<sup>a</sup></b>		<b>2012</b>
		<b>2014</b>	<b>2013</b>	
a. Retirees currently receiving benefits	4,566	4,423	4,160	3,899
b. Beneficiaries currently receiving benefits	542	520	520	495
c. Terminated vested employees entitled to future benefits from Defined Benefit Plans	779	753	800	723
d. Terminated non-vested employees entitled to contribution refunds from Defined Benefit Plan:	8	14	51	21
e. Active employees in defined benefit plans	7,580	7,676	7,599	7,836
i. Aggregate Salary <sup>b</sup>	\$384,270,155	\$389,410,214	\$376,296,674	\$366,882,467
ii. Vested <sup>c</sup>	4,726	4,881	4,885	4,964
iii. Non-vested	2,854	2,795	2,715	2,872
f. Participants in cash balance plans	1,462	1,476	1,429	1,387
i. Aggregate Salary	\$47,537,851	\$45,193,710	\$44,490,671	\$41,143,383
ii. Active	1,214	1,185	1,131	1,158
iii. Inactive	248	291	298	229

*a Includes traditional defined benefit non-county plans, traditional defined benefit county plans, and cash balance plans*

*b Actual salary for preceding valuation date*

*c Count of vested participants estimated based on service as of the valuation date*

PENNSYLVANIA MUNICIPAL RETIREMENT SYSTEM  
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APPENDIX A  
MEMBERSHIP INFORMATION

**Distribution of All Active Members  
by Age and Service as of January 1, 2015**

COUNTS BY AGE/SERVICE

Age	Service										Total
	1 year or less	1 to 2	2 to 3	3 to 5	5 to 10	10 to 15	15 to 20	20 to 25	25 to 30	30 & up	
Under 20	9	0	0	0	0	0	0	0	0	0	9
20 to 24	93	52	21	12	4	0	0	0	0	0	182
25 to 29	129	91	80	88	100	2	0	0	0	0	490
30 to 34	103	83	59	89	232	75	4	0	0	0	645
35 to 39	76	48	52	75	227	222	46	1	0	0	747
40 to 44	63	54	59	94	237	233	154	71	11	0	976
45 to 49	76	78	59	99	236	275	226	143	88	3	1,283
50 to 54	78	73	52	78	256	252	218	194	180	117	1,498
55 to 59	65	67	35	89	228	267	231	184	164	236	1,566
60 to 64	30	44	20	55	133	145	138	113	118	206	1,002
65 & up	10	8	12	12	62	69	66	60	46	51	396
Total	732	598	449	691	1,715	1,540	1,083	766	607	613	8,794

PENNSYLVANIA MUNICIPAL RETIREMENT SYSTEM  
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APPENDIX A  
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**Distribution of Active Defined Benefit Members  
by Age and Service as of January 1, 2015**

COUNTS BY AGE/SERVICE

Age	Service										Total
	1 year or less	1 to 2	2 to 3	3 to 5	5 to 10	10 to 15	15 to 20	20 to 25	25 to 30	30 & up	
Under 20	8	0	0	0	0	0	0	0	0	0	8
20 to 24	89	48	18	11	4	0	0	0	0	0	170
25 to 29	119	85	75	75	89	2	0	0	0	0	445
30 to 34	93	74	49	78	205	69	4	0	0	0	572
35 to 39	69	47	41	67	199	202	44	1	0	0	670
40 to 44	53	48	45	81	204	206	135	67	10	0	849
45 to 49	68	65	48	86	201	242	202	135	76	2	1,125
50 to 54	70	60	39	61	218	224	177	172	160	109	1,290
55 to 59	49	61	26	66	188	225	195	153	142	211	1,316
60 to 64	24	38	17	39	107	124	113	92	104	174	832
65 & up	7	6	9	7	55	53	51	42	36	37	303
Total	649	532	367	571	1,470	1,347	921	662	528	533	7,580

**PENNSYLVANIA MUNICIPAL RETIREMENT SYSTEM  
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**Distribution of Active Cash Balance Members  
by Age and Service as of January 1, 2015**

**COUNTS BY AGE/SERVICE**

Age	Service										Total	
	1 year or less	1 to 2	2 to 3	3 to 5	5 to 10	10 to 15	15 to 20	20 to 25	25 to 30	30 & up		
Under 20	1	0	0	0	0	0	0	0	0	0	0	1
20 to 24	4	4	3	1	0	0	0	0	0	0	0	12
25 to 29	10	6	5	13	11	0	0	0	0	0	0	45
30 to 34	10	9	10	11	27	6	0	0	0	0	0	73
35 to 39	7	1	11	8	28	20	2	0	0	0	0	77
40 to 44	10	6	14	13	33	27	19	4	1	0	0	127
45 to 49	8	13	11	13	35	33	24	8	12	1	1	158
50 to 54	8	13	13	17	38	28	41	22	20	8	8	208
55 to 59	16	6	9	23	40	42	36	31	22	25	25	250
60 to 64	6	6	3	16	26	21	25	21	14	32	32	170
65 & up	3	2	3	5	7	16	15	18	10	14	14	93
<b>Total</b>	<b>83</b>	<b>66</b>	<b>82</b>	<b>120</b>	<b>245</b>	<b>193</b>	<b>162</b>	<b>104</b>	<b>79</b>	<b>80</b>	<b>80</b>	<b>1,214</b>

**PENNSYLVANIA MUNICIPAL RETIREMENT SYSTEM  
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**APPENDIX A  
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**Pennsylvania Municipal Retirement System Distribution of Active Members  
by Age and Service as of January 1, 2015**

**AVERAGE SALARY BY AGE/SERVICE**

Age	Service										Total
	1 year or less	1 to 2	2 to 3	3 to 5	5 to 10	10 to 15	15 to 20	20 to 25	25 to 30	30 & up	
Under 20	\$18,725	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$18,725
20 to 24	\$21,914	\$38,371	\$43,303	\$43,980	\$50,981	\$0	\$0	\$0	\$0	\$0	\$31,178
25 to 29	\$24,314	\$40,049	\$44,224	\$43,967	\$45,547	\$60,131	\$0	\$0	\$0	\$0	\$38,496
30 to 34	\$26,544	\$41,133	\$43,666	\$49,076	\$53,013	\$56,394	\$61,268	\$0	\$0	\$0	\$46,303
35 to 39	\$22,692	\$47,769	\$44,182	\$47,708	\$51,413	\$60,003	\$62,093	\$34,195	\$0	\$0	\$50,569
40 to 44	\$24,243	\$41,001	\$45,214	\$46,495	\$50,768	\$57,965	\$60,476	\$64,144	\$69,543	\$0	\$52,203
45 to 49	\$24,016	\$42,757	\$43,140	\$43,682	\$48,648	\$53,019	\$56,428	\$62,496	\$62,378	\$52,509	\$50,996
50 to 54	\$26,882	\$43,400	\$47,629	\$42,591	\$47,641	\$49,767	\$50,837	\$59,563	\$61,269	\$59,470	\$51,018
55 to 59	\$24,783	\$49,317	\$45,119	\$42,079	\$44,545	\$49,812	\$51,377	\$52,926	\$56,766	\$58,132	\$50,020
60 to 64	\$25,771	\$45,865	\$38,503	\$44,488	\$47,876	\$47,329	\$48,951	\$53,092	\$55,548	\$59,446	\$50,692
65 & up	\$29,195	\$31,810	\$32,292	\$44,005	\$39,831	\$41,377	\$41,885	\$43,169	\$53,997	\$57,053	\$44,279
<b>Total</b>	<b>\$24,490</b>	<b>\$42,878</b>	<b>\$43,981</b>	<b>\$44,978</b>	<b>\$48,648</b>	<b>\$52,802</b>	<b>\$53,220</b>	<b>\$56,669</b>	<b>\$58,700</b>	<b>\$58,712</b>	<b>\$49,103</b>



**PENNSYLVANIA MUNICIPAL RETIREMENT SYSTEM  
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**APPENDIX A  
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**Inactive Benefit Payment Distribution  
as of January 1, 2015**

COUNTS BY BENEFIT/AGE: RECEIVING PAYMENTS

Age	Monthly Benefit	Count
x < 30	\$3,581	3
30 <= x < 35	\$1,497	3
35 <= x < 40	\$3,484	13
40 <= x < 45	\$8,021	20
45 <= x < 50	\$40,437	57
50 <= x < 55	\$201,690	122
55 <= x < 60	\$755,447	421
60 <= x < 65	\$1,429,006	879
65 <= x < 70	\$1,593,346	1,215
70 <= x < 75	\$1,032,483	905
75 <= x < 80	\$611,972	641
80 <= x < 85	\$380,147	430
85 <= x	\$266,921	399
<Total>	\$6,328,030	5,108

COUNTS BY BENEFIT/AGE: DEFERRED PAYMENTS

Age	Monthly Benefit	Count
x < 30	\$1,505	5
30 <= x < 35	\$5,953	15
35 <= x < 40	\$22,202	41
40 <= x < 45	\$53,349	77
45 <= x < 50	\$128,733	148
50 <= x < 55	\$174,156	190
55 <= x < 60	\$167,158	216
60 <= x < 65	\$62,371	77
65 <= x < 70	\$2,324	5
70 <= x < 75	\$1,554	3
75 <= x < 80	\$1,084	2
80 <= x < 85	\$0	0
85 <= x	\$0	0
<Total>	\$620,388	779

Deferred payments listed above are attributable to defined benefit plans only. Deferred payments to the 248 cash balance participants will be determined upon their retirement.

**PENNSYLVANIA MUNICIPAL RETIREMENT SYSTEM  
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**APPENDIX B  
ACTUARIAL ASSUMPTIONS AND METHODS**

**Actuarial Assumptions:**

The actuarial assumptions were adopted by the Board based upon the results of an actuarial experience study covering the period January 1, 2005 through December 31, 2008, which was provided in 2010. A new study was performed for the period January 1, 2009 through December 31, 2013 and presented to the Board in 2015. Based on that study, changes were adopted for an effective date of January 1, 2016 and are not reflected in this valuation. In addition, the Board continually reviews the regular interest rate assumption, which is used as the discount rate, and adopted the rate of 5.50% effective with the 2013 valuation. The current PMRS actuarial assumptions used in this valuation are as follows.

**A. Healthy Life Mortality:**

**Rates of Pre-Retirement Mortality**

Males: RP 2000 with 1 year set back

Females: RP 2000 with 5 year set back

**Rates of Post-Retirement Mortality**

Males and females: RP 2000 Sex-Distinct Mortality Table

The current mortality assumptions, while not explicitly reflecting projections for improvements as recommended under Actuarial Standard of Practice No. 35, are subject to experience review every four years at which time the Board receives recommendations of changes to reflect changes in experience over those expected from the tables applied over the five-year period preceding the experience analysis. Based upon this experience study completed in 2010, overall these mortality tables provide projected improvements in the future. Such experience review is required by State statute.

In addition, the retired life reserves measured by PMRS is annually reviewed against the actuarial liability for retirees to ensure they are within a reasonable level of difference which has been proven to remain consistent year by year as a reflection of the effectiveness of the reserves and the underlying actuarial assumption for mortality.

**B. Disabled Life Mortality Rates:**

Males and females: RP 2000 with 10 year set forward

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**C. Termination Rates Before Retirement**

<b>Termination Rates for Municipal Participants</b>		
<b>Service</b>	<b>Number of Active Members in Plan</b>	
	<b>&lt;25</b>	<b>25+</b>
<1	20.0%	20.0%
1	20.0%	20.0%
2	12.0%	15.0%
3	10.0%	12.0%
4	8.0%	7.0%
5	6.0%	7.0%
6	4.0%	6.0%
7	3.0%	5.0%
8	3.0%	5.0%
9	2.5%	5.0%
10+	2.5%	3.0%

<b>Termination Rates for Uniformed Participants</b>		
<b>Service</b>	<b>Number of Active Members in Plan</b>	
	<b>&lt;25</b>	<b>25+</b>
<1	14%	13%
1	14%	10%
2	12%	7%
3	10%	7%
4	6%	6%
5	4%	5%
6	3%	4%
7	2%	3%
8	2%	3%
9	1%	3%
10+	1%	3%

**D. Disability Incidence Rates:**

**Municipal** - 40% of 1964 OASDI (Social Security) Experience for Males. Sample rates are:

<b>Age</b>	<b>Valuation Rate (%)</b>
25	0.034%
35	0.059
45	0.144
55	0.404
65	0.928

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**Uniformed plans** – 60% of 1964 OASDI (Social Security) Experience for Males. Sample rates are:

Age	Valuation Rate (%)
25	0.051%
35	0.088
45	0.216
55	0.605
65	1.393

Type of Disability:

- (a) 15% of disablements are assumed to be service related for municipal plans, and
- (b) 50% of disablements are assumed to be service related for uniform plans.

**E. Workers Compensation:** Service-related disability benefits payable from municipal plans are offset by 25% of final average salary.

**F. Salary Scale:**

Age	Salary Scale
	Total Rate (%)* (including inflation)
25	8.30%
30	6.40%
35	5.60%
40	5.00%
45	4.20%
50	4.10%
55	3.90%
60	3.70%
65	3.00%

\*Add 2% for each of the first three years of service.

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**G. Rates of Retirement:**

(a) Non-uniformed Plans:

<b>Retirement Rates for Non-uniformed Participants</b>	
<b>Age</b>	<b>Municipal Rate of Retirement<sup>1</sup></b>
Under 46	5%
46 – 54	15
55 – 59	10
60 – 61	10
62	30
63 – 64	20
65	35
66 – 74	15
75	100

*1 Rates indicated are adjusted by adding 5% (and 10% for ages 60-62 under current rate assumptions) for the year in which the member is first eligible for normal retirement.*

(b) Uniformed Plans:

<b>Retirement Rates for Uniform Participants</b>	
<b>Age</b>	<b>Rates for all Plans</b>
<b>&lt;49</b>	0%
<b>50</b>	20%
<b>51</b>	10%
<b>52</b>	10%
<b>53</b>	10%
<b>54</b>	10%
<b>55</b>	20%
<b>56</b>	25%
<b>57</b>	25%
<b>58</b>	30%
<b>59</b>	30%
<b>60</b>	40%
<b>61</b>	50%
<b>62</b>	50%
<b>63</b>	60%
<b>64</b>	70%
<b>65</b>	80%
<b>66+</b>	100%

**H. Marital Status and Spouse’s Age (if applicable):**

85% of active members are assumed to be married for retirees with the 50% J&S form of payment. Male spouses are assumed to be three-years older than female spouses.

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**I. Social Security Projections (if applicable):**

- (a) The Social Security Taxable Wage Base will increase by 3.5% compounded annually;
- (b) The Consumer Price Index will increase 3.0% compounded annually; and
- (c) The Average Total Wages of All Workers will increase by 3.5% compounded annually.

**J. Post-Retirement Cost of Living Increases (if applicable):**

3.0% per year, subject to plan limitations.

**K. Investment Return Assumption:**

5.50% compounded annually, net of investment expenses.

**L. Administrative Expenses:**

The expense assumption is based upon the expected expenses for the current year. For 2015, this amount was \$4,102,422.

**Actuarial Methods:**

Contribution requirements are individually determined for each participating municipality, on an actuarial basis as described below, at least biennially. The frequency of the actuarial valuation is determined by applicable Commonwealth statute (Act 205 of 1984 and Act 293 of 1972). The following actuarial methods were adopted effective January 1, 1985, unless indicated otherwise.

**Actuarial Value of Assets:**

Sum of all audited reserve accounts as of the valuation date, including Member, Municipal, Retired, Disability, and DROP Reserves, and a one-year administration expense reserve, plus the portion of any additional investment income to be distributed as “excess interest.” The actuarial value can never be less than 90 percent of fair market value.

Each year, municipalities may receive an excess interest allocation derived as a portion of new surplus created during the prior year based on the current financial standing of the System. “Surplus” refers to the excess of fair market value over the actuarial value of assets. Once the preliminary actuarial asset value has been determined, a formula is used to allocate the new surplus. Generally, depending on the relative size of surplus to fair market value, between 10 percent and 90 percent of the new surplus will become excess interest.

Based on the unique legislative structure of PMRS, because assets are set equal to reserves under the System, they do not necessarily relate directly or indirectly with the current market value of assets as required under Actuarial Standard of Practice Statement No. 44 which states under Section 3.3:

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*“...the actuary should select an asset valuation method that is designed to produce actuarial values of assets that bear a reasonable relationship to the corresponding market values. The qualities of such an asset valuation method include the following:*

- a. The asset valuation method is likely to produce actuarial values of assets that are sometimes greater than and sometimes less than the corresponding market values.*
- b. The asset valuation method is likely to produce actuarial values of assets that, in the actuary’s professional judgment, satisfy both of the following:*
  - 1. The asset values fall within a reasonable range around the corresponding market values. For example, there might be a corridor centered at market value, outside of which the actuarial value of assets may not fall, in order to assure that the difference from market value is not greater than the actuary deems reasonable.*
  - 2. Any differences between the actuarial value of assets and the market value are recognized within a reasonable period of time. For example, the actuary might use a method where the actuarial value of assets converges toward market value at a pace that the actuary deems reasonable, if the investment return assumption is realized in future periods.*

*In lieu of satisfying both (1) and (2) above, an asset valuation method could satisfy section 3.3(b) if, in the actuary’s professional judgment, the asset valuation method either (i) produces values within a sufficiently narrow range around market value or (ii) recognizes differences from market value in a sufficiently short period.”*

**The administrative rules adopted by the PMRS Board in conjunction with Pennsylvania Municipal Retirement System Law, which are not subject to comply with Actuarial Standards of Practice (ASOP), when defining the Actuarial Value of Assets, does not necessarily meet the requirement of ASOP 44 Selection and Use of Asset Valuation Methods for Pension Valuations. The Actuarial Value of Assets provided within this report follow the Pennsylvania Municipal Retirement System Law and the PMRS policy statement.**

**Actuarial Cost Method:** Entry Age Normal Actuarial Cost Method.

The Entry Age Normal Actuarial Cost Method was used for active employees, whereby the normal cost is computed as the level annual percentage of pay required to fund the retirement benefits between each member’s date of hire and assumed retirement. Entry age is defined as attained age less credited service. The normal cost is based on taking the value, as of entry age into the plan, of each member’s projected future benefits. This value is then divided by the value, also at entry age, of each member’s expected future salary producing a normal cost rate as a percent of salary. The normal cost rate is multiplied by current salary to determine each member’s normal cost. If a plan provides for a Separate Member Annuity through required member contributions, this contribution rate is then added to the total normal cost rate to determine the final total normal cost rate. Within the MMO calculation, the normal cost is reduced by the member contribution to produce the employer normal cost to be paid.

The actuarial liability is the difference between the present value of future benefits and the present value of future normal cost. The unfunded actuarial liability is the difference between the actuarial liability and the actuarial value of assets.

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**Funding of the Unfunded Actuarial Liability:**

Actuarial gains (or losses), including the effect of contributions greater or lesser than the previously determined actuarial level, are reflected by decreases (or increases) in the unfunded actuarial liability. Under Act 205 of 1984, and updated by Act 44, the unfunded actuarial liability is amortized as a level dollar amount over the lesser of:

- (a)
  - (i) 30 years, with respect to the initial liability as of 1/1/85 (or first valuation);
  - (ii) 20 years, with respect to actuarial gains and losses;
  - (iii) 15 years, with respect to changes due to actuarial assumptions;
  - (iv) 20 years, with respect to changes due to plan provisions (if state mandated);
  - (v) 10 years, with respect to changes in benefits for currently active members and 1 year of retired members (if local benefit changes); or
- (b) The average assumed working lifetime of active employees as of the date the liability was established. If there are no active employees, the unfunded liability is amortized one year after the liability was established.

With the two exceptions which follow, the funding method is applied individually with respect to each municipality:

- 1) Retired and disabled members are paid monthly benefits from the System's Retired Reserve account, which at the time of retirement receives a transfer from the municipal and member accounts in an amount actuarially determined to be sufficient to pay all future benefits for the member (and, if applicable, a surviving beneficiary). Thus, post-retirement experience is pooled with the System.
- 2) A disabled member's pension is met in part from the amount that can be provided by the value of that portion of the member's accrued benefit attributable to municipal contributions, with the balance of the pension being provided by the appropriate transfer from the Disability Reserve Account. The amount of annual transfer from the accumulated municipal contributions to the Disability Reserve Account is determined on the one year term cost basis, i.e., the expected cost of disabilities in the coming year.

**Changes in Actuarial Assumptions and Methods:** None