Classic Values, Innovative Advice

Pennsylvania Municipal Retirement System

Actuarial Valuation as of January 1, 2018

Produced by Cheiron

May 2019

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May 8, 2019

Pennsylvania Municipal Retirement Board of the
Pennsylvania Municipal Retirement System
c/o Stephen W. Vaughn, Secretary
1721 North Front Street
Harrisburg, Pennsylvania 17102-2315

Re: PMRS 2018 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, 2018. The purpose of this report is to provide the aggregate valuation results of the participating employers for the System and analyze the System-wide asset and liability performance with projections. The report provides statistics on the employer contribution levels for all plans participating in the system as of the valuation date, incorporating the individual Governmental Accounting Statements No. 67 and 68 (GASB 67/68) results for each plan.

This report reflects the actuarial liabilities for the county plans, which are explicitly calculated as of January 1, 2018. The liabilities for 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 for these plans. The liabilities for the non-county defined benefit plans (i.e. municipal and authority defined benefit plans) are explicitly valued every odd calendar year and are based on the January 1, 2017 actuarial liabilities. These liabilities are rolled-forward and reflect an adjustment for active and terminated vested liabilities and the explicit retiree liabilities as of January 1, 2018, in addition to any material changes.

This report was prepared for the Board 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 analyzes combined 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 Auditor General of the Commonwealth of Pennsylvania. We refer you to the Foreword and Board Summary which presents the general approach used in the preparation of this report with a focus on a big picture view of the System, historical trends developed by Cheiron, and future stress testing of the System. We also comment on the sources and reliability of both the data and the actuarial assumptions on which our findings are based. These comments support the information presented throughout our report.

Pennsylvania Municipal Retirement Board of the
Pennsylvania Municipal Retirement System
May 8, 2019

This report and its contents have been prepared in accordance with generally recognized and accepted actuarial principles and practices and our understanding of the Code of Professional Conduct and applicable Actuarial Standards of Practice set out by the Actuarial Standards Board as well as applicable laws and regulations. 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, EA
Principal Consulting Actuary

Karen Zangara

Karen M. Zangara, FSA, MAAA, EA
Principal Consulting Actuary

Anthony Bucci, FCA, MAAA, EA
Consulting Actuary

cc: Charity D. Rosenberry, CPA
Jonathan B. Chipko, FSA

FOREWORD

Cheiron performed the actuarial valuation of the Pennsylvania Municipal Retirement System (System) as of January 1, 2018. 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) as well as additional information as requested by PMRS based on information provided by the Government Finance Officers Association (GFOA).

An actuarial valuation establishes and analyzes System assets and liabilities on a consistent basis and traces the progress 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 of our findings while 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 traditional defined benefit plans' contribution rates by component.

Section V includes the required disclosures under GASB as well as additional information provided in the System's Comprehensive Annual Financial Report (CAFR) based on GFOA guidance.

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 as provided by the System and submitted to the Commonwealth through the 2017 Act 205 filings and 2018 Act 293 filings.

We have rolled forward the liabilities for the non-county defined benefit plans to January 1, 2018. These liabilities reflect material changes (such as plan changes) if applicable. These liabilities are incorporated into all of the 2018 liability calculations to provide a reasonable estimate for the aggregate System results.

FOREWORD

The System is bound by Act 293 to complete a biennial valuation for each county plan, and these results as of January 1, 2018 are included into this report. For municipalities with cash balance plans and all participants in pay status, the liabilities as of January 1, 2018 reflect the data provided by the System as of this date. Further information on these techniques can be found in Appendix B under “Method to Roll Forward Liabilities”.

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 No. 23 (Data Quality).

The actuarial assumptions reflect the Board’s understanding of the likely future experience of the System, as well as adopted formal procedures by the Board in the reviewing and setting of the interest rate assumption. The assumptions as a whole represent the best estimate for the future experience of the System. These assumptions reflect the experience analysis and our presentation of appropriate assumptions in accordance with the Actuarial Standards of Practice No. 27 (Selection of Economic Assumptions for Measuring Pension Obligations) and No. 35 (Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations) in performing actuarial valuations of retirement systems. 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.

The results of this report are dependent upon future experience conforming to these assumptions. To the extent that plan experience differs from that anticipated by the assumptions, there are changes in assumptions or plan provisions, or changes to applicable law, the true cost for each of the plans could vary from our results. As such, future valuation reports may differ significantly from the current report presented in this document.

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.

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 county plans participating in the System and the full valuation of the cash balance plans,
- Roll-forward of non-county defined benefit plans,
- 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, 2018 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 county plans are valued every other year. Throughout our report, our discussion will address changes from January 1, 2016, the last time the county plans were valued, to the most recent valuation date of January 1, 2018. In other parts of the discussion, we address the overall status of the System. In this case, we compare results from January 1, 2017 to January 1, 2018 to identify the changes in the overall System's funded status. The January 1, 2017 valuation results reflect the explicit valuation of the cash balance and non-county defined benefit pension plans, and a roll-forward of the county plan liabilities based upon the January 1, 2016 results. The January 1, 2018 valuation results reflect the explicit valuation of the cash balance and county plans, and a roll-forward of the liabilities for non-county defined benefit plans based on the January 1, 2017 results.

A. Valuation Basis

The January 1, 2018 valuation results are based on the actuarial assumptions approved by the Board for the January 1, 2016 valuation and a 5.25% interest rate assumption, as adopted by the Board in November 2016, effective January 1, 2017. No assumption changes were effective with the January 1, 2018 valuation.

Below we identify the following key results of this valuation.

- *Asset Experience:* On an Actuarial Value of Assets (AVA) basis, the return is 5.25% based on the Regular Interest Rate determined by PMRS for the plan year ending December 31, 2017. However, on a Market Value of Assets (MVA) basis the average investment return for the year ending December 31, 2017 resulted in a money-weighted return rate of 17.84% used to measure the System's experience for valuation purposes. The strong investment return for the year is the primary reason for many of the results in this valuation improving compared to the prior year's report as well as the Asset Surplus, as noted below.
- *Asset Surplus:* For the first time since 2008, the System's MVA exceeded the reserves, the primary component of the AVA. This created a surplus, as defined in the Board Policy 05-2.

SECTION I – BOARD SUMMARY

- *Reduction in Retired Members' Reserve Account (Retiree Reserve) Deficit:* As a result of the Asset Surplus, the Board decided to reduce the deficit in the Retiree Reserve compared to the retiree liability for the System by transferring $45.5 million from this surplus to the Retiree Reserve account. This deficit in the Retiree Reserve was a result of the retiree liabilities exceeding this reserve account due to changes in the actuarial assumptions (i.e. decrease in the discount rate to 5.25% and updated mortality tables that reflect longer life expectancy) which increased the liabilities due to an expectation that retirees will live longer than originally expected as of their retirement date and due to actual experience.

- *Excess Interest:* After reviewing the results following the asset transfer to the Retiree Reserve, the Board awarded $25.85 million in Excess Interest to the member plans, in accordance with Board Policy 05-2, to offset unfunded liabilities or improve benefits (based on applicable law). The liabilities associated with the additional benefits offered under the Excess Interest distribution will not be incorporated into our valuation until January 1, 2019.

- *Actuarial Value of Assets:* The Actuarial Value of Assets equals the sum of the reserve information provided in the System's December 31, 2017 CAFR and the adjustment for the transfer of $45.5 million to the Retiree Reserve. The AVA in this valuation does not reflect the $25.85 million (unless otherwise mentioned) to ensure the comparison of the assets and liabilities are analogous. The term Preliminary Actuarial Value of Assets is the defined term in Board Policy 05-2. Throughout this report we will simply refer to this asset value as the Actuarial Value of Assets (AVA).

- *Actuarial Liabilities:* The January 1, 2018 Actuarial Liabilities (AL) represent the explicit valuation of the cash balance and county plans, and a roll-forward of the liabilities for non-county (municipal and authority) defined benefit plans based on the January 1, 2017 results. The System's AL increased by $80.1 million, from $2,320.8 million to $2,400.9 million, primarily due to additional accruals during the past year with interest, offset by benefit payments paid to retirees. There was an actuarial gain of $2.9 million attributable to lower salary increases and more deaths than expected.

- *Preliminary Actuarial Value of Assets vs. Actuarial Liabilities:*

    - *Surplus Actuarial Liability (SAL):* The SAL is the excess of the System's AVA over the AL. Because the System is made of many individual plans, some with a SAL and others with an Unfunded Actuarial Liability (UAL), the aggregate funding level for the System indicates that the individual plan SAL is greater than the UAL. In aggregate, the System's SAL is $3.6 million as of January 1, 2018. Last year the Actuarial Liabilities exceeded the Actuarial Value of Assets (AVA) and the UAL was $50.5 million.
    - The Funding Ratio of the System's AVA to Actuarial Liability increased from 97.8% as of January 1, 2017 to 100.2% as of January 1, 2018.

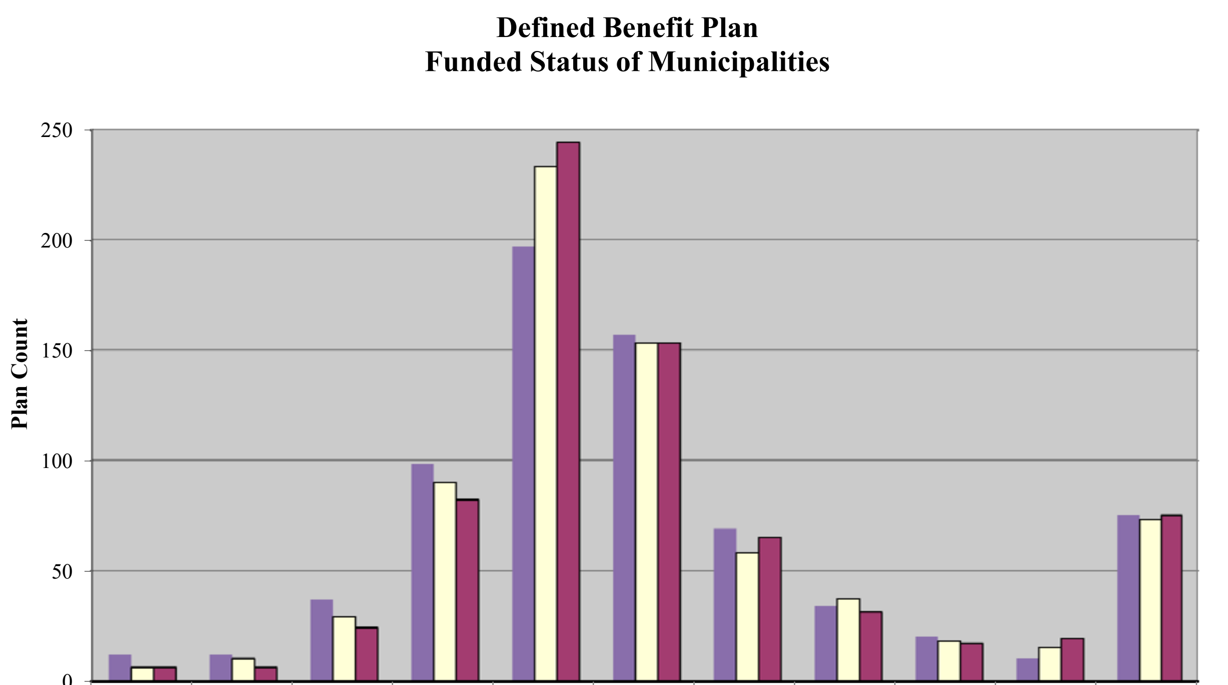
- *Market Value of Assets vs. Actuarial Liabilities:* On a snapshot basis, comparing the MVA to AL provides information of the progress of the System's funding status on the valuation date. As of January 1, 2018 the MVA exceeded the AL resulting in a surplus of $90.7 million compared to the unfunded liability of $169.4 million as of January 1, 2017. This change was primarily due to strong market gains during the past year, as indicated previously.

SECTION I – BOARD SUMMARY

The following chart shows a distribution of the individual employer funded status for the defined benefit plans (both non-county and county plans) using actuarial value of assets of the plans covered by the System in 2015, 2017 and 2018. The assumption change is reflected in the chart below in the yellow bars for 2017. Because the majority of the 2018 bars are based on a roll forward of the 2017 AL with no substantive changes, overall these bars are very similar, but still tend toward improved funding.

As of January 1, 2018, about 18% of the defined benefit plans were less than 90% funded. This is an improvement when compared to 19% and 22% as of January 1, 2017 and January 1, 2015, respectively.

As of January 1, 2018, 52% of the defined benefit plans were 100% funded or more. This is an improvement compared to 49% and 51% as of January 1, 2017 and January 1, 2015, respectively.



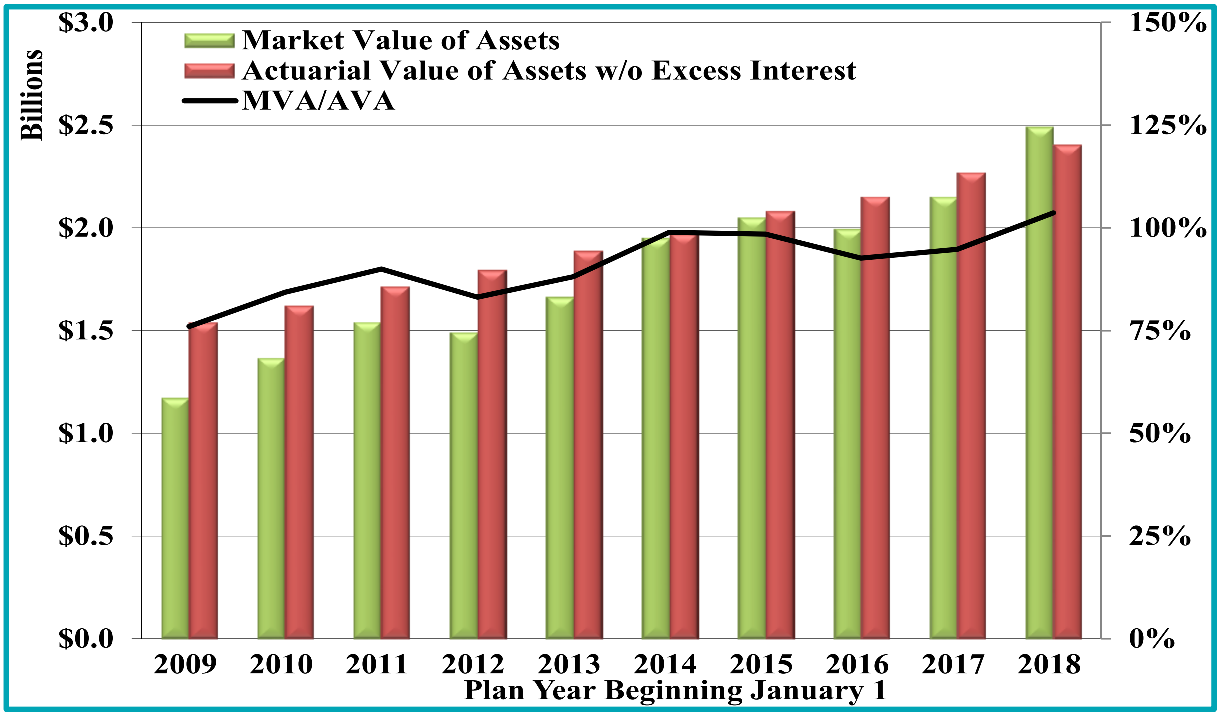
	<60%	60 - 69%	70 - 79%	80 - 89%	90 - 99%	100 - 109%	110 - 119%	120 - 129%	130 - 139%	140 - 149%	>150%
2015	12	12	37	98	197	157	69	34	20	10	75
2017	6	10	29	90	233	153	58	37	18	15	73
2018	6	6	24	82	244	153	65	31	17	19	75

Number of Plans Based on Associated Funding Ratio

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 and reflects the crediting of the Regular Interest Rate and actual cash flows without regard to the actual investment return of the System.

SECTION I – BOARD SUMMARY

The Market Value of Assets money-weighted returns for the plan years ended 2016 and 2017 were 8.2% and 17.8%, respectively. Comparing the Actuarial Value of Assets to the Market Value of Assets provides a representation of System assets to the aggregate individual plan assets. As a result of the investment returns for the prior year, the previous year's Market Value deficit (i.e. aggregate individual plan assets in excess of System assets) of $118.9 million has decreased to an $87.1 million asset surplus. The following table shows the historic relationship between the Market Value of Assets (MVA; green 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 to the System.



In prior years, when the ratio of Market Value of Assets (MVA) to Actuarial Value of Assets (AVA) is less than 100%, any shortfall between the AVA and MVA must come from future investment earnings in excess of the Regular Interest Rate. 2018 is the first year since 2009 that the MVA exceeded the AVA. The Board adopted to maintain the same Regular Interest Rate from January 1, 2017 of 5.25% for this valuation.

B. Current Financial Condition

On the following pages, we summarize the key results of the January 1, 2018 valuation and how they compare to the results from the January 1, 2017 valuation.

1. System Membership:

Table I-1 shows total membership in the Retirement System increased by 2.4% from 2017 to 2018. The active participant counts reported for the Traditional Defined Benefit Plans increased by 1.8% while the active cash balance plan participation increased by 6.4%, showing a continued increased growth in the cash balance plans over the traditional defined benefit plan.

Table I-1
Membership Total

	January 1, 2018	January 1, 2017	% Change
Traditional Defined Benefit Actives	7,868	7,728	1.8%
Cash Balance Benefit Actives	1,387	1,303	6.4%
Terminated Vesteds	1,090	1,150	-5.2%
Participants Receiving Benefit Payments	5,307	5,099	4.1%
Inactive Nonvested Participants with Balances	35	28	25.0%
Beneficiaries	599	600	-0.2%
Total System Members	16,286	15,908	2.4%
Annual Salaries*	$494,567,532	$476,619,568	3.8%
Average Salary per Active Member	$53,438	$52,776	1.3%

** Annualized salary paid during the prior plan year for Traditional Defined Benefit plan participants and actual salary for active cash balance participants*

SECTION I – BOARD SUMMARY

Table I-2 summarizes 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 January 1, 2018	Valuation as of January 1, 2017	Percent Change
Number of plans:			
Traditional Defined Benefit Plans	730	722	1.11%
Cash Balance Plans	314	311	0.96%
Total	1,044	1,033	1.06%
Active Employees in Traditional Defined Benefit Plans:			
Count	7,868	7,728	1.81%
Average Age	48.0	48.1	-0.31%
Average Service	12.2	12.4	-1.69%
Total Payroll*	$ 434,554,380	$ 422,621,214	2.82%
Average Pay	$ 55,231	$ 54,687	0.99%
Active Employees in Cash Balance Plans:			
Count	1,387	1,303	6.45%
Average Age	50.2	50.3	-0.33%
Average Service	11.5	11.9	-3.46%
Total Payroll*	$ 60,013,152	$ 53,998,354	11.14%
Average Pay*	$ 43,268	$ 41,442	4.41%
Total Active PMRS Participants	9,255	9,031	2.48%
Inactive Nonvested Participants with account balances:	35	28	
Deferred Vested Participants:			
Traditional Defined Benefit Plans	797	834	-4.44%
Cash Balance Plans	293	316	-7.28%
Pensioners:			
Count	5,307	5,099	4.08%
Average Age	69.9	69.7	0.36%
Average Monthly Benefit	$ 1,367	$ 1,334	2.43%
Number of New Awards	383	447	-14.32%
Average New Monthly Benefit	$ 1,576	$ 1,562	0.90%
Number Receiving Legislated COLA	192	277	-30.69%
Survivor Beneficiaries:			
Count	599	600	-0.17%
Average Age	74.3	74.3	-0.05%
Average Monthly Benefit	$ 980	$ 935	4.91%
Total Inactive PMRS Participants	7,031	6,877	2.24%

** Annualized salary paid during the prior plan year for Traditional Defined Benefit plan participants and actual salary for active cash balance participants.*

SECTION I – BOARD SUMMARY

2. System Assets and Liabilities:

Table I-3 presents a comparison between the January 1, 2017 and January 1, 2018 System assets, liabilities, unfunded actuarial liability, and funding ratios for traditional defined benefit municipal (non-county), traditional defined benefit county, and cash balance plans. While this valuation was prepared based on the explicit valuation of the county and cash balance plans, we have rolled forward municipal (non-county) active participant and vested terminated liabilities from the 2017 valuation. Retiree liabilities are recalculated annually based on actual data. Liabilities for the 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 97.8% as of January 1, 2017 to 100.2% as of January 1, 2018. Similarly, the overall funding ratio based on the Market Value of Assets increased from 92.7% as of January 1, 2017 to 103.8% as of January 1, 2018.

SECTION I – BOARD SUMMARY

Table I-3
Total Plan Assets and Liabilities ($ thousands)

	January 1, 2018	January 1, 2017	% Change to Baseline
Traditional Defined Benefit (Non-county) Plans:			
Actives	$ 1,073,517	$ 1,058,864	1.4%
Terminated Vesteds	81,108	80,001	1.4%
In Pay Status	988,595	937,977	5.4%
Total Actuarial Liability[2]	$ 2,143,220	$ 2,076,842	3.2%
Actuarial Value of Assets[1]	2,139,585	2,068,136	3.5%
Unfunded/(Surplus) of Actuarial Liability	$ 3,635	$ 8,706	-58.2%
Traditional Defined Benefit (County) Plans:			
Actives	$ 68,295	$ 69,830	-2.2%
Terminated Vesteds	12,584	10,895	15.5%
In Pay Status	46,569	43,070	8.1%
Total Actuarial Liability	$ 127,447	$ 123,795	3.0%
Actuarial Value of Assets[1]	126,210	120,399	4.8%
Unfunded/(Surplus) of Actuarial Liability	$ 1,237	$ 3,396	-63.6%
Cash Balance Plans:			
Actives	$ 83,386	$ 77,236	8.0%
Terminated Vesteds	16,526	15,307	8.0%
In Pay Status	30,332	27,586	10.0%
Total Actuarial Liability	$ 130,244	$ 120,129	8.4%
Actuarial Value of Assets[1]	131,571	121,239	8.5%
Unfunded/(Surplus) of Actuarial Liability	$ (1,327)	$ (1,110)	
Total of All Plans			
Actives	$ 1,225,198	$ 1,205,930	1.6%
Terminated Vesteds	110,218	106,203	3.8%
In Pay Status	1,065,496	1,008,633	5.6%
Total Actuarial Liability	$ 2,400,912	$ 2,320,766	3.5%
Market Value of Assets (MVA)	$ 2,491,620	$ 2,151,378	15.8%
Actuarial Value of Assets (summation of above)[1]	$ 2,397,366	$ 2,309,774	3.8%
Expenses in Excess of Assessment	5,458	5,814	-6.1%
Actuarial Value of Asset Adjustment[3]	1,675	(45,310)	-103.7%
Actuarial Value of Assets[4]	$ 2,404,499	$ 2,270,278	5.9%
Excess Interest Distribution	$ 25,851	$ 0	
Actuarial Value of Assets Reflecting Excess Interest[5]	$ 2,430,350	$ 2,270,278	7.1%
Unfunded/(Surplus) using Actuarial Value	**$ (3,587)**	**$ 50,488**	**-107.1%**
Funding Ratio on Actuarial Asset Value	**100.2%**	**97.8%**	**2.4%**
Unfunded/(Surplus) using Market Asset Value	**$ (90,708)**	**$ 169,388**	**-153.6%**
Funding Ratio on Market Asset Value	**103.8%**	**92.7%**	**12.0%**

1 County plan liabilities are estimated in odd years and municipal (non-county) defined benefit liabilities are estimated in even years based upon a roll-forward of the prior year's liabilities; Liabilities associated with participants in non-operational plans are included in the non-county plan liabilities

2 The assets shown above are attributable to the cash balance and traditional defined benefit non-county and county plans based on updated data and information provided. The cash balance assets reflect un-distributable forfeitures associated with terminated plan participants.

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 Actuarial Value of Assets reflect the asset value based on member, municipal, retiree, disability & DROP reserve accounts as approved by the Board along with the $45.5 million transfer to the Retiree Reserve for the 2018 assets and provided by PMRS in the 2016 and 2017 CAFR.

5 The Actuarial Value of Assets reflecting the Excess Interest reflects the Board's award, but until the determination of new liabilities from this award has been finalized, this value will not be incorporated into the results (i.e. 2018).

SECTION I – BOARD SUMMARY

Table I-4 summarizes the January 1, 2018 municipal traditional defined benefit plans that are in a surplus or underfunded position.

Table I-4
Funded Status of County Plans

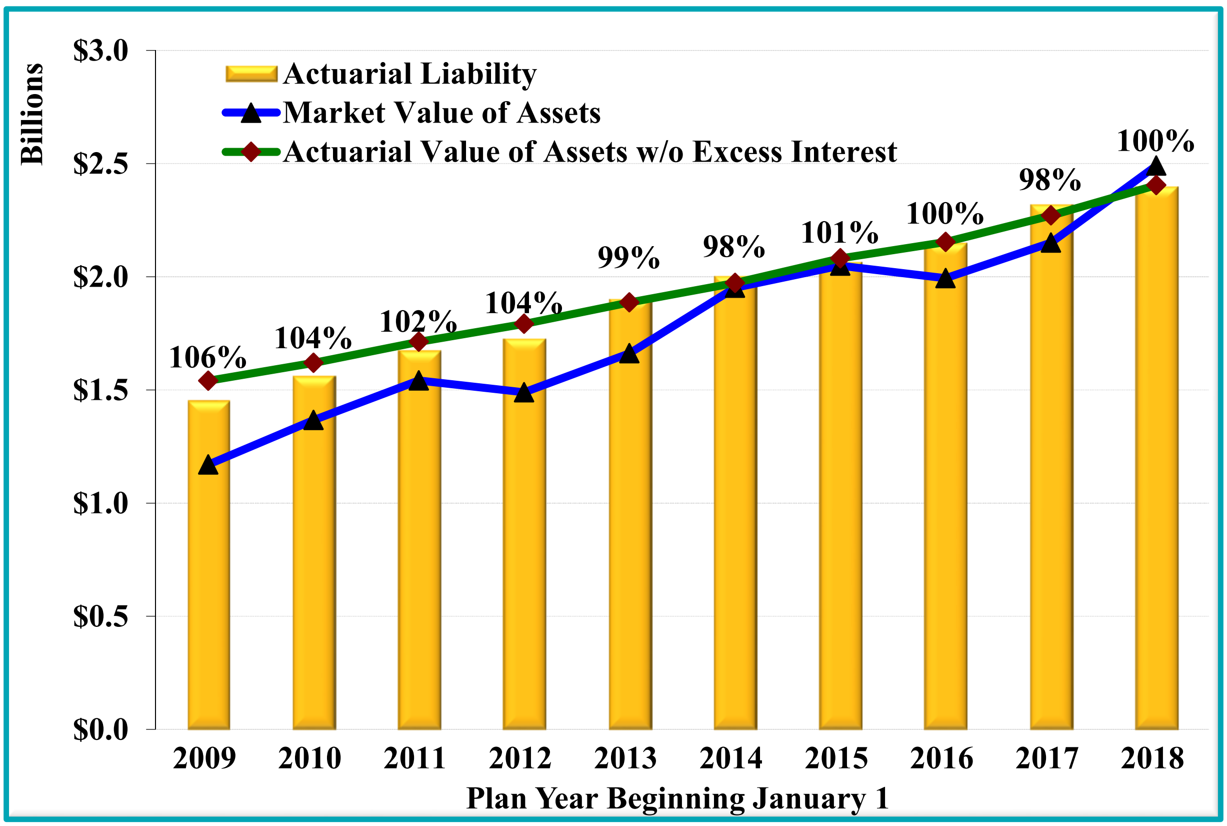
	January 1, 2018	January 1, 2016
A. County Plans in a surplus position		
1. Number of plans with a surplus	2	1
2. Actuarial Value of Assets in plans with a surplus	$112,416,606	$26,963,368
3. Actuarial Liability in plans with a surplus	111,260,249	26,707,991
4. Amount of surplus (2. – 3.)	$1,156,357	$255,377
B. County Plans in an underfunded position		
1. Number of underfunded plans	2	3
2. Actuarial Value of Assets in underfunded plans	$13,793,295	$86,821,476
3. Actuarial Liability in underfunded plans	16,187,124	89,061,211
4. Amount of (unfunded) liability (2. – 3.)	($2,393,829)	($2,239,735)

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 (i.e. traditional defined benefit and cash balance) market and actuarial value of assets compared to the total System 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 2009.

Pennsylvania Municipal Retirement System Assets and Liabilities – 2009 to 2018

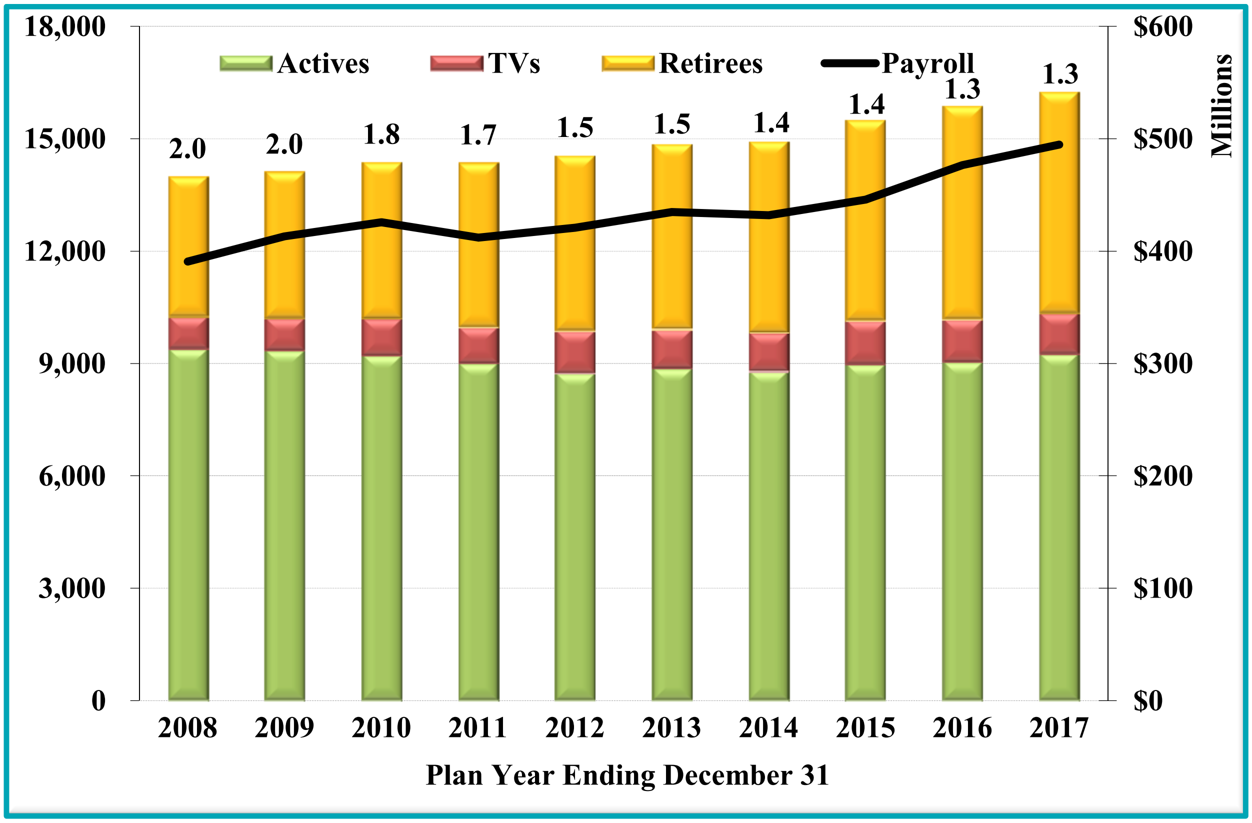


In 2017, the Regular Interest Rate (investment rate assumption) decreased from 5.50% to 5.25%, causing an increase in liabilities (the yellow bars). As of this valuation, the individual municipal reserves that make up the Actuarial Value of Assets are more than the Actuarial Liability resulting in a System surplus.

The funding ratio on a Market Value of Assets basis is important to understand the underlying System's risks. The 2018 Market Value of Assets exceeds the Actuarial Liability, such that on that basis, the funding ratio would be 103.8%.

SECTION I – BOARD SUMMARY

Pennsylvania Municipal Retirement System Participant Counts – 2008 to 2017 Year End



The chart above shows a comparison of the demographic makeup of the System over the last ten years. The black line represents the active payroll and corresponds to the right-hand axis. The number above the bars represents the ratio of active to inactive participants which is decreasing steadily.

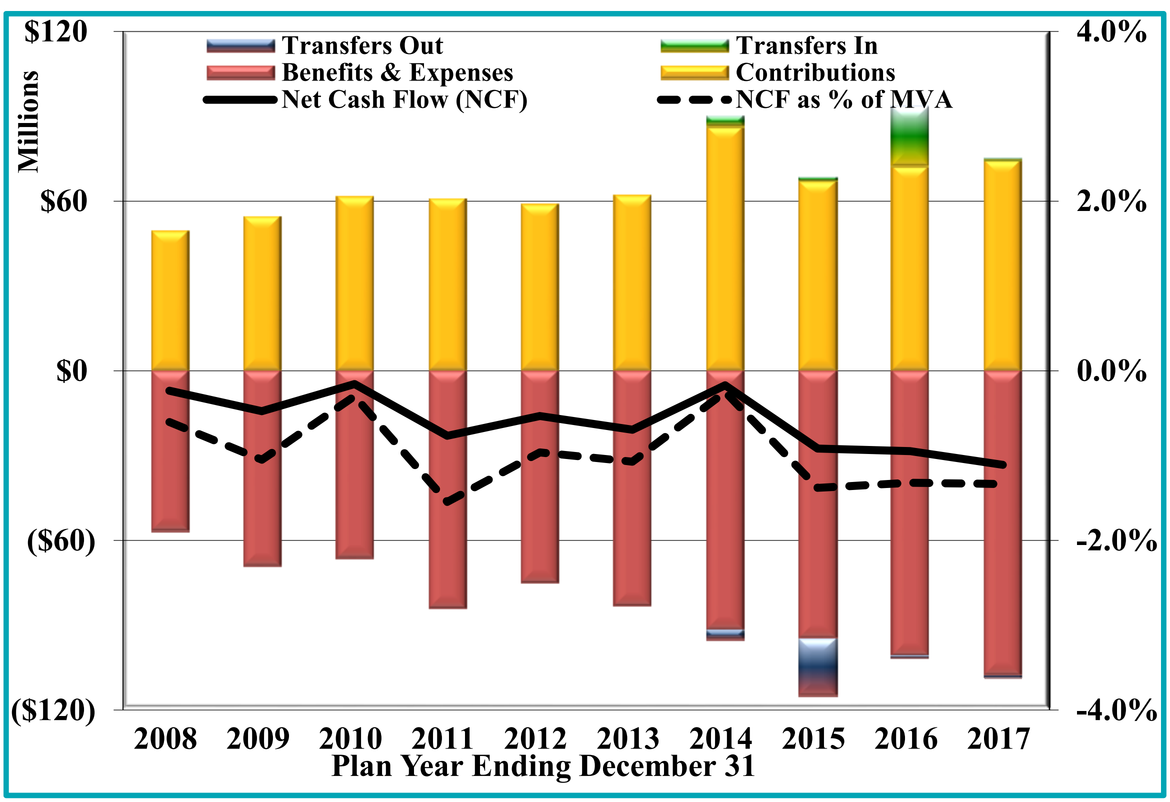
A retirement system has a life cycle, reaching maturity when as many or more of the covered participants are non-active (retirees and terminated vested participants). When this occurs, the ratio moves closer to and sometimes below 1.0. The System is maturing as indicated by the steadily declining ratio of active to inactive participants. 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. This supports part of the rationale for the reduction in the interest rates in the past. Prolonged recovery is primarily due to a decrease in net cash flows (occurring when benefit payments and expenses exceed contributions).

SECTION I – BOARD SUMMARY

This next graph tracks the cash flow since 2008. An important risk element of a retirement system is the implication of net cash flow (NCF), which is represented by the black line, 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 pay the benefit payments. This is referred to as negative cash flow which is typical among retirement systems where the number of retirees increases 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 of December 31, 2017, this resulted in a $33.2 million negative cash flow, excluding transfers into and out of the System, which is the equivalent of 1.3% of MVA. As the graph below illustrates, the negative net cash flow falls within the range of 0.1% to 2.0% of total assets, averaging to negative 1.0% (-1.0%) over the ten-year period. 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 at least equal to the net negative cash flow.

The volatility of the net cash flow is a function of contributions and benefit payments. Beginning in 2014, the transfer of funds into the System from new participating municipalities and asset outflows to municipalities that choose to leave the System, which can vary greatly from year to year, is excluded from the calculation of the net cash flow. The incorporation of transfers into and out of the System can be found in Table II-2 for the past year and is shown below in the shaded bars dating back to 2014, the first year this information was available.

Pennsylvania Municipal Retirement System Cash Flows – 2008 through 2017



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, 2018 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 using four different assumptions:

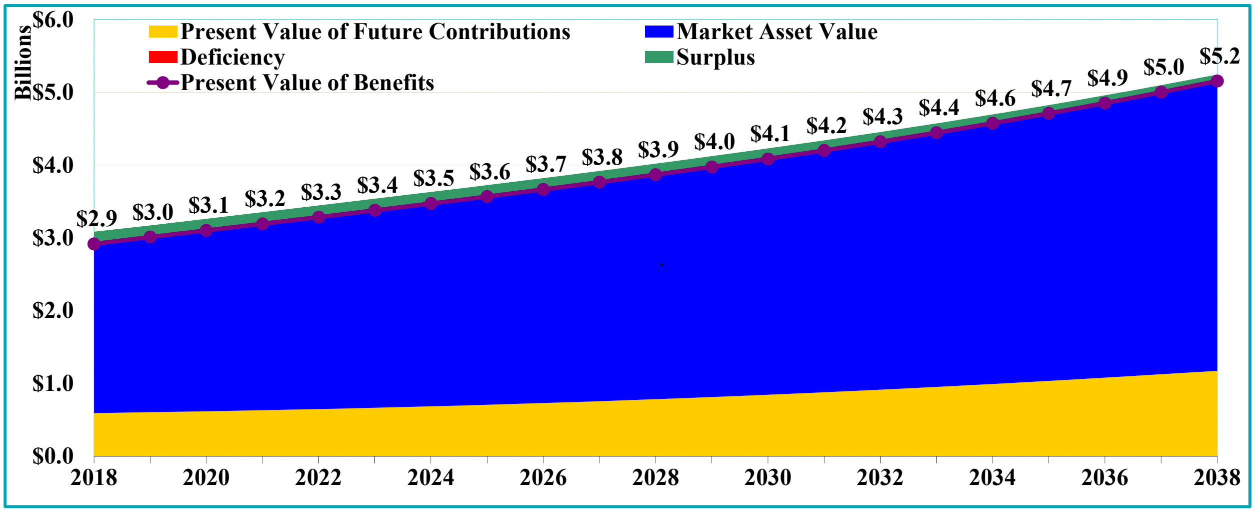
1) Assuming 5.25% investment returns each and every year,
2) Assuming 7.50% investment returns each and every year,
3) Assuming average investment returns over 20 years equal 5.25% but vary annually based on the returns provided in Table I-5. We do this to demonstrate a more realistic projection because 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 (shown by the purple line) of the System, assuming the current active population, consistently increase. 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* (PVB). This amount takes into account the present value of all benefits earned (Actuarial Liability) plus benefits assumed to be earned into the future based on future accruals for the defined benefit plans only. This amount represents the System's total obligation over time for the defined benefit plans. Due to the plan design for the cash balance plans, these plans are generally fully funded because the benefits paid are based on the accounts due to contributions. Therefore, the PVB equals the AL for the cash balance plans.

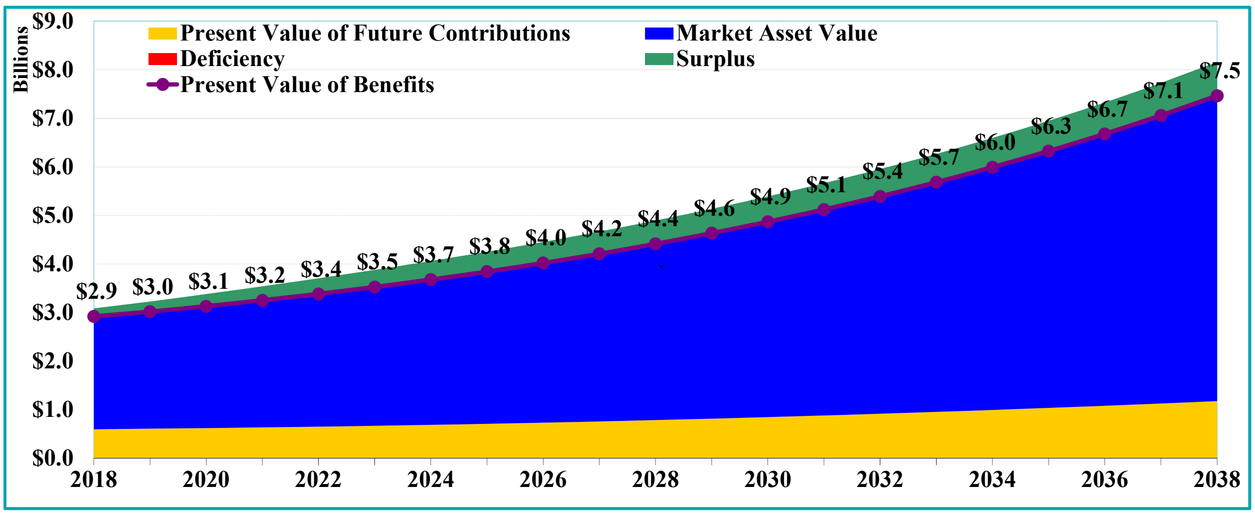
To meet these obligations, the System has resources which include the Market Value of Assets (in blue) and the present value of future contributions (in gold). To the extent these two sources are insufficient to meet the obligations today or in the future, the result will be a deficit (in red). If the 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 5.25%, the only resource to cover a deficit or create an increasing surplus is through average future investment returns at a System level that exceed the 5.25% rate.

Under the first projection, the present value of the System's expected obligations (PVB) are fully met throughout the projection. This occurs primarily because the System's expected resources from current assets (MVA) and future contributions exceed the PVB as of January 1, 2018. We would anticipate that using the current assumptions and a 5.25% annual return that these two components will grow at a similar rate, resulting in the slight surplus seen throughout.

SECTION I – BOARD SUMMARY



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



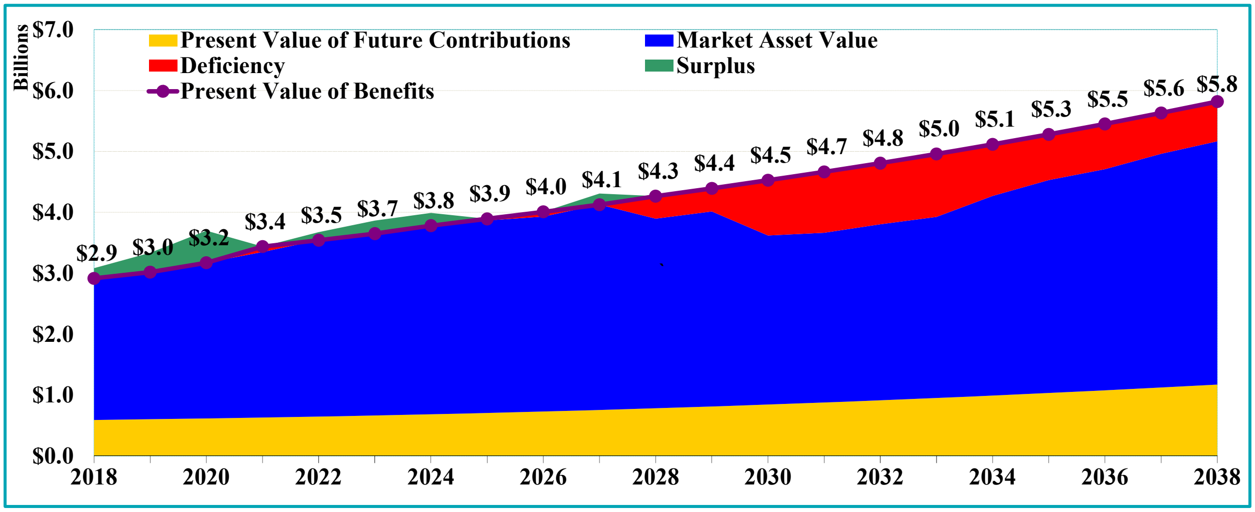
This projection shows the surplus of assets outpacing the obligations over the 20 year projection because the annual investment return is 2.25% larger than the Regular Interest Rate. In addition, the projected Present Value of Benefits increases under this scenario because excess interest is assumed to be distributed and increase benefits in the individual pension plans. Excess interest can only be used to reduce that plan's unfunded liability until that plan's funded status is at least 95% funded, instead of providing cost of living increases or benefit improvements, based upon Pennsylvania Municipal Retirement Law.

The System's return on assets each year will not equal 5.25% but will, over time, be volatile with returns above and below the assumption. Based on the hypothetical future return rates in Table I-5 on the next page, which yield an average 5.25% 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. This illustration shows that as the System continues to mature, poor investment returns can materially impact the future funded status.

SECTION I – BOARD SUMMARY

Table I-5
Projected Returns Equal to the Valuation Rate

Fiscal Year	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Return	12.00%	15.00%	-10.00%	14.00%	8.00%	5.75%	-2.00%	4.00%	14.00%	-10.00%
Fiscal Year	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Return	6.00%	-10.50%	4.00%	7.50%	6.50%	14.00%	10.00%	7.00%	8.75%	7.00%



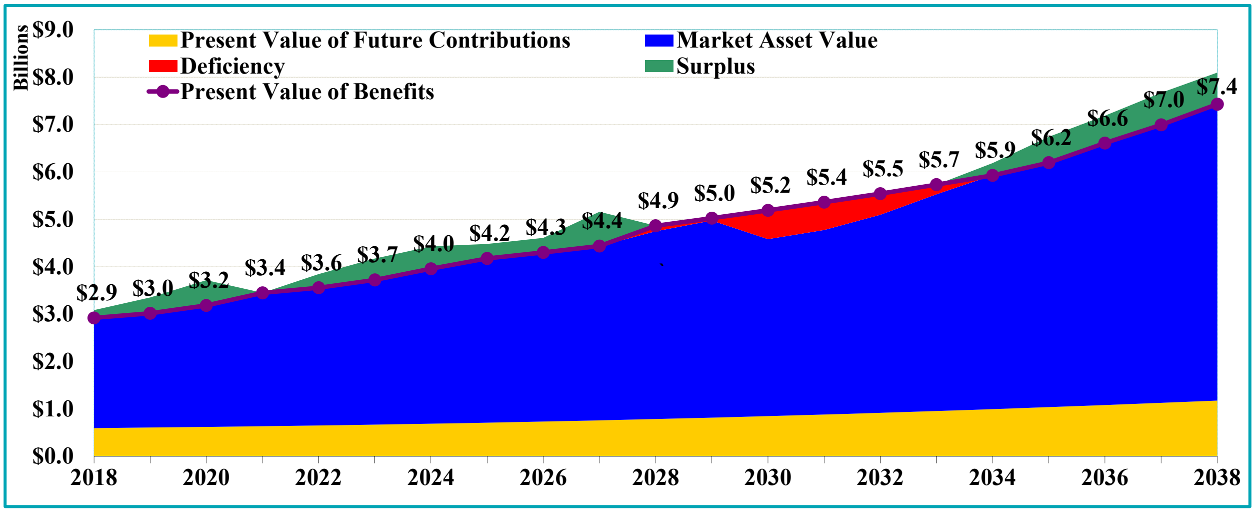
Based on this illustration, without returns averaging in excess of 5.25%, the fund will fluctuate from positions of surplus and deficit due to market volatility, anticipated negative cash flows, and additional liabilities paid to participants in the form of excess interest based on Board policy and final approval. This illustrates that there are still risks of material underfunding even if the System return rate of 5.25% is met.

SECTION I – BOARD SUMMARY

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 7.50% as summarized in Table I-6. The fund would likely remain in a surplus at the end of the period.

Table I-6
Projected Returns Equal to 7.5%

Fiscal Year	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Return	12.50%	15.00%	-8.00%	17.00%	12.00%	9.00%	3.00%	5.00%	16.00%	-8.00%
Fiscal Year	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Return	7.50%	-8.00%	7.00%	10.00%	12.00%	16.00%	12.00%	9.00%	9.00%	7.50%



An asset return expectation that is greater than the crediting rate tends to stabilize the funded status by minimizing the amount and frequency of times when the fund could once again become underfunded.

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 funded status, 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, 2017 and December 31, 2016;
- 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 "snapshot" 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 as provided in the December 31, 2017 PMRS CAFR.

Table II-1
Statement of Assets at Market Value December 31 ($ Thousands)

	2017	2016
Assets		
Equity Investments	$ 1,658,662	$ 1,395,780
Accounts Receivable	5,599	5,660
Fixed Income Investments	408,219	336,624
Real Estate Investments	438,583	424,342
Fixed Assets	442	93
Accounts Payable	(4,815)	(3,239)
Net Pension Liability	(4,475)	(4,693)
Net OPEB Obligation Liability	(6,768)	(799)
Investment Purchases Payable	(4,155)	(3,331)
Net Deferred Outflow of Resources	328	941
Total Market Value of Assets	**$ 2,491,620**	**$ 2,151,378**

SECTION II – ASSETS

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

Table II-2
Changes in Market Value in ($ Thousands)

Market Value of Assets – January 1, 2017			**$**	**2,151,378**
Change in Accounting Principles				**(6,528)**
Additions				
Contributions:				
Municipal Employers	$	52,834		
Plan Members		21,718		
Transfers from other plan administrators		612		
Assessments		248		
Total Contributions			$	75,412
Investment Income:				
Net Appreciation (Depreciation) In Fair Value Of Investments	$	358,062		
Short-Term And Other Investments		532		
Common And Preferred Stock		10,881		
Real Estate		16,153		
International Equities		5,355		
Less Investment Expenses		(10,841)		
Net Investment Income			$	380,142
Total Additions			**$**	**455,554**
Deductions				
Annuity Benefits and terminations	$	(102,318)		
Transfers to other plan administrators		(760)		
Administrative Expenses		(5,706)		
Total Deductions			**$**	**(108,784)**
Market Value of Assets – January 1, 2018			**$**	**2,491,620**

From Table II-2 it is important to recognize that annuity benefits, terminations, transfers to other plan administrators, and administrative expenses of $108.8 million exceeds contribution income and transfers into the system of $75.4 million for a net negative cash flow of $33.4 million, which is approximately 1.3% of the end of year Market Value of Assets.

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 exceeds the Actuarial Value of Assets. The steps in the determination of the Actuarial Value of Assets as of December 31, 2017 are shown below. When the Market Value of Assets exceeds the Actuarial Value of Assets there is an asset surplus. Because the Market Value of Assets exceeded the reserves by $87.1 million as of December 31, 2017 after reflecting the $45.5 million transfer from Undistributed Earnings to the Retiree Reserve, the Board decided to award excess interest to the member plans in accordance with Policy Statement 05-2.

Table II-3
Development of Actuarial Value of Assets ($ Thousands)

1. Prior Year Actuarial Value	$	2,270,278
2. Total Audited Reserve Accounts [a]	$	2,399,041
3. Expected Administrative Expenses Net of Assessment		5,458
4. Preliminary Actuarial Value (2+3)	$	2,404,499
5. Current Year Market Value of Assets		2,491,620
6. Prior Year Market Value of Assets		2,151,378
7. New Surplus {Minimum of [(5-4)&(5-4)-(6-1)]}		87,121
8. Percentage of New Surplus Credited as Excess Interest		29.672%
9. Excess Interest (Maximum of 0 and (7x8)) available	$	25,851
10. Excess Interest awarded	$	25,851
11. Actuarial Value of Assets Reflecting Excess Interest (4+10) [b]	**$**	**2,430,350**

[a] *See Table II-4b.*

[b] *The Actuarial Value of Assets reflecting the Excess Interest distribution is not compared to the AL within this report because the AL will not reflect the excess interest distribution as of December 31, 2018 until January 1, 2019. Hence, the Preliminary Actuarial Value of Assets in line item 4 is the Actuarial Value of Assets (AVA) throughout this report.*

Excess Interest Allocation

Each year, municipalities may be eligible to receive a supplemental allocation of investment monies beyond the regular 5.25% interest rate effective until December 31, 2017. 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, 2017, there was an $87.1 million surplus equal to the Market Value of Assets in excess of the Actuarial Value of Assets after reflecting the $45.5 million transfer from Undistributed Earnings to the Retired Members' Reserve Account. The calculation in Table II-4a details the calculation resulting in a $25.9 million excess interest award for this year which is allocated to the member plans.

SECTION II – ASSETS

Table II-4a
Determination of Excess Interest ($ Thousands)

1. Assets		
a. Market value	$	2,491,620
b. Preliminary Actuarial Value		2,404,499
c. Available Surplus (1a. - 1b.)	**$**	**87,121**
2. Reserves		
a. Members' Reserve Account	$	460,806
b. Municipal Accounts		871,062
c. Disability Reserve Account		1,299
d. Retired Members' Reserve Account [a]		1,064,326
e. DROP Participant Reserve Account		1,548
f. Total (2a. + 2b. + 2c. + 2d. + 2e.)	**$**	**2,399,041**
3. Last year's surplus	$	0
4. New surplus (1c. - 3.)	$	87,121
5. Excess percent of New Surplus (see Table II-4b)		29.672%
6. Excess Interest Awarded	$	25,851
7. Percent of reserve {6. / (2f. - 2c.)}		1.08%
8. Trial Surplus/(Deficit) (1c. - 6.)	$	61,270
9. Trial margin percent {8. / 1a.}, not less than 0		2.46%

[a] *Reflects the $45.5 million transfer as approved by the Board during the July 2018 meeting.*

SECTION II – ASSETS

Table II-4b
Determination of Excess Percent of New Surplus ($ Thousands)

1. Market Value of Assets	$	2,491,620
2. Available Surplus	$	87,121
3. Margin (2. / 1.)		3.50%
4. Available Surplus/(Deficit) last year	$	(118,900)
5. New Surplus (2. - 4., but not greater than 2.)	$	87,121
6. New Margin (5. / 1.)		3.50%
7. Excess Percent (10% + 8*3.) / (100% + 8*6.)		29.6724%

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 municipal (non-county) plan liabilities for the 2018 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, 2018 valuation for the county plans. This information for the non-county plans is based on the prior year valuation results rolled forward one year. For the analysis of the deficit/surplus of the Present Value of Benefits (PVB) outlined below, the PVB of the cash balance plans equals the AL because these plans are generally fully funded due to their plan design.

Table III-1
Obligation Deficit/(Surplus) Analysis of All PMRS Plans

	January 1, 2018	January 1, 2017
Present Value of All Benefits - Total Obligation		
Active Participant Benefits	$ 1,740,624,198	$ 1,697,656,933
Retiree and Inactive Benefits	1,175,715,217	1,114,835,472
Present Value of Benefits (PVB)	**$ 2,916,339,416**	**$ 2,812,492,405**
Present Value of Future Contributions (PVFC)	(592,052,494)	(564,877,774)
Municipal Market Value of Assets (MVA)	(2,491,619,728)	(2,151,378,301)
Net (Surplus)/Deficit of Resources to Obligation (PVB + PVFC + MVA)	**$ (167,332,806)**	**$ 96,236,330**
Actuarial Liability		
Present Value of Benefits (PVB)	$ 2,916,339,416	$ 2,812,492,405
Present Value of Future Normal Cost Contributions (PVFNC)	(515,427,496)	(491,727,021)
Actuarial Liability (AL = PVB - PVFNC)	**$ 2,400,911,920**	**$ 2,320,765,384**
Actuarial Value of Assets (AVA)	(2,404,498,404)	(2,270,278,691)
Net Unfunded/(Surplus) (AL + AVA)	**$ (3,586,484)**	**$ 50,486,693**

Unrounded values may differ from the rounded values in other sections of report. January 1, 2018 information reflects the present value of the cash balance contributions and Normal Cost.

SECTION III – LIABILITIES

Changes in Liabilities

The Actuarial Liabilities shown in the following table change with each valuation based on the experience of the Plan. The liability may change for any of several reasons, including:

- New hires since the last valuation
- Benefits accrued since the last valuation
- Plan amendments
- Interest on Actuarial Liability
- Benefits paid to retirees and beneficiaries
- Participants leaving employment at rates different than expected
- Participants transferring to other Plans within the System
- Plans transferring into and out of the System
- Changes in actuarial assumptions
- Changes in actuarial methods

The following table shows the sources of the Actuarial Liability changes since the last valuation.

Table III-2
Actuarial Liability Reconciliation

Actuarial Liability as of 1/1/2017	$	2,320,765,569
Actuarial Liability as of 1/1/2018		2,400,911,920
Liability Increase/(Decrease)		80,146,351
Changes due to		
Normal Cost	$	62,457,152
Interest		122,169,899
Benefit Changes		301,741
(Gains)/Losses		(2,857,638)
Benefit Payments		(102,317,747)
Transfers		392,944
Total	$	80,146,351

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 67/68. Incorporating this cost method results in four components 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 the lesser of 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. 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 2017 Act 205 forms for 2019 and 2020 MMO contributions and 2018 Act 293 forms for 2020 and 2021 MMO contributions. The combination of underfunded and surplus plans would not necessarily be informative in reviewing the overall funded status of the System.

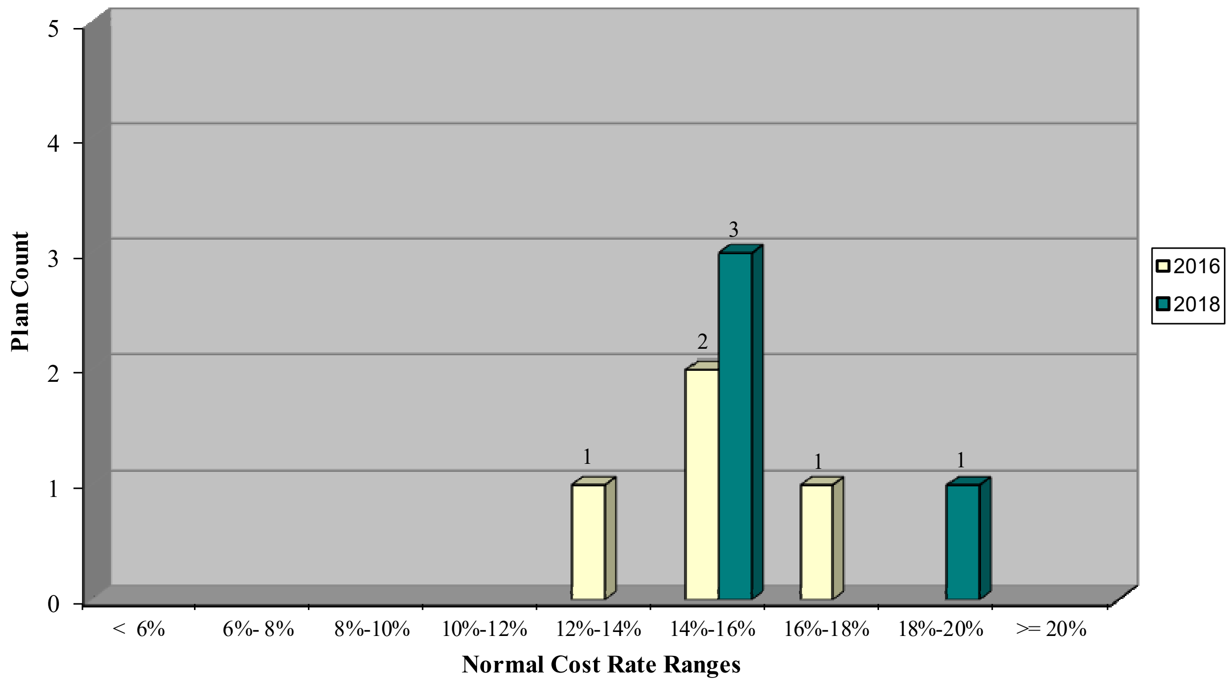
On the following pages, we describe the cost components and provide graphically the distribution of costs among the participating county plans.

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.

SECTION IV – CONTRIBUTIONS

The following chart is a summary of the normal cost rates determined for the traditional defined benefit county plans as of January 1, 2016 and January 1, 2018.

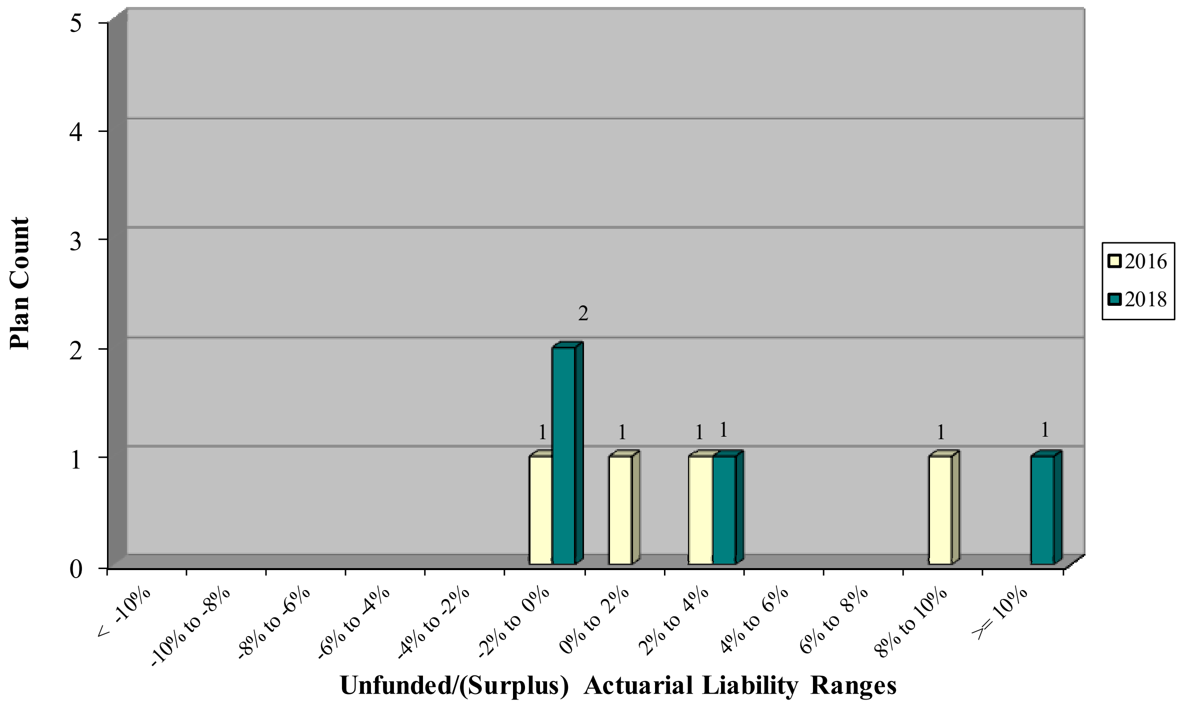
Chart IV-1
Distribution of Normal Cost Rates as a Percentage of Payroll
PMRS County Plans



SECTION IV – CONTRIBUTIONS

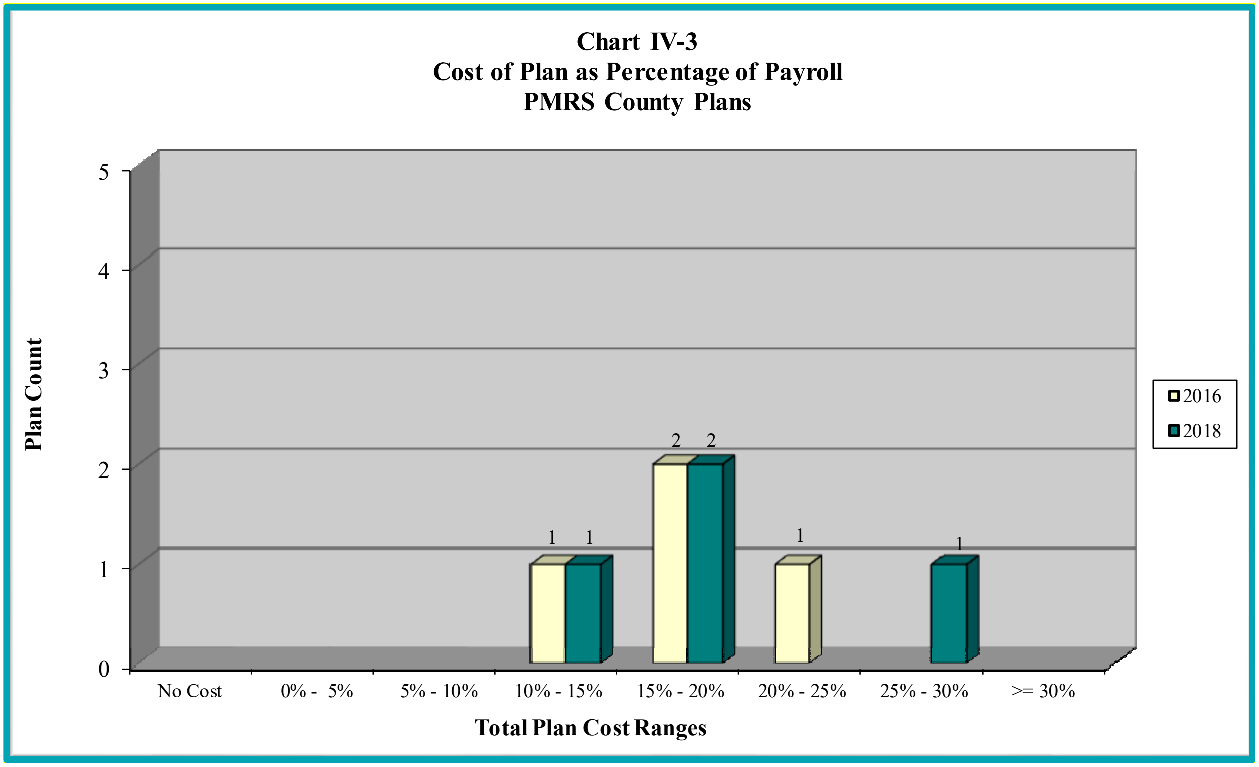
Chart IV-2 below is a summary of the unfunded/(surplus) actuarial liability amortization costs defined as a percent of covered payroll of each plan's active members, determined for the traditional defined benefit county plans as of January 1, 2016 and January 1, 2018.

Chart IV-2
Amortization of Unfunded/(Surplus) as a Percentage of Payroll
PMRS County Plans



SECTION IV – CONTRIBUTIONS

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 county plans as of January 1, 2016 and January 1, 2018.



SECTION V – ACCOUNTING AND FINANCIAL STATEMENT INFORMATION

GASB Statements No. 67 (GASB 67) and No. 68 (GASB 68) established standards for disclosure of pension information by public employee retirement systems and governmental employers in notes to financial statements and supplementary information. The System is defined as an agent multiple-employer plan system under GASB 67. The assets of an agent multiple-employer plan system 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 5.25% 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 by Status with Six Year Trend; and
- Table V-6 is the Schedule of Total Membership and Salary.

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, 2018– County Plans and Cash Balance (CB) Plans January 1, 2017 – Plans that are neither County nor CB plans
Measurement date	January 1, 2018
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*	5.25%
Projected salary increases*	2.8%-7.05%
*Includes inflation at	2.8%
Cost-of-living adjustments	ad hoc

The actuarial assumptions used have been adopted by the System's Board based on the most recent review of the System's experience for the period January 1, 2009 through December 31, 2013 and completed in 2015 and the updated investment rate of return assumption of 5.25% as of January 1, 2017 based on the Board's review of this assumption during 2016.

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 (or surplus if funds exceed the liabilities). The allowance for administrative expenses is based on the System's actual administrative expenses.

SECTION V – ACCOUNTING AND FINANCIAL STATEMENT INFORMATION

Table V-2
SOLVENCY TEST
Aggregate Accrued Liabilities for

Valuation Date January 1,	Active Member (1)*	Retirees, Beneficiaries & Vested Terminated (2)	Active Member Employer Financed Contributions (3)	Actuarial Value of Reported Assets	Portion of Accrued Liabilities Covered by Reported Assets (1)	(2)	(3)
2018	$460,805,568	$1,175,715,217	$764,391,135	$2,404,498,404	100%	100%	100%
2017	451,613,188	1,114,835,472	754,316,724	2,270,278,691	100%	100%	93%
2016	435,834,498	999,866,637	715,640,331	2,153,625,821	100%	100%	100%
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%

**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
GASB Statement No. 67 Disclosure

Valuation Date January 1,	Actuarial Value of Assets (A)	Actuarial Liability (AL) Entry Age (B)	Unfunded AL (Surplus) (B-A)	Funded Ratio (A/B)	Discount Rate
2018	$2,404,498,404	$2,400,911,920	$(3,586,484)	100.1%	5.25%
2017	2,270,278,691	2,320,765,384	50,486,693	97.8%	5.25%
2016	2,153,625,821	2,151,341,466	(2,284,355)	100.1%	5.50%
2015	2,081,439,591	2,067,264,850	(14,174,741)	100.7%	5.50%
2014	1,972,273,674	2,005,222,107	32,948,433	98.4%	5.50%
2013	1,886,703,664	1,903,572,061	16,868,397	99.1%	5.50%

The actuarial assumptions as of January 1, 2018 are shown in the assumptions and methods section. The above information was derived from membership data, as provided by the System, regarding:

Valuation Date	Valuation of Defined Benefit Liabilities: Complete Valuation	Roll-Forward	Cash Balance Plans
January 1, 2018	4	726	314
January 1, 2017	718	4	311
January 1, 2016	4	718	294
January 1, 2015	717	4	286
January 1, 2014	4	712	268
January 1, 2013	710	4	251

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.

Table V-4
Schedule of Retirees and Beneficiaries - Added to and Removed from Rolls in Last Six Years

Valuation Date January 1,	Added to roll	Average Annual Annuities Added	Average Annual Benefit Increase	Deleted from roll	Average Annual Annuities Removed	Number on roll	Annual Annuities	Percentage Increase in Annuities	Average Annual Annuities	Percent Increase in Average Annuities
2018	383	$18,912	575	176	$9,325	5,906	$94,073,168	6.5%	$15,928	2.7%
2017	447	18,744	490	108	8,174	5,699	88,360,677	9.5%	15,505	2.9%
2016	339	18,888	161	87	18,915	5,360	80,729,221	6.3%	15,061	1.3%
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%

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

Table V-5
Schedule of Total Membership by Status
Six Year Trend

Valuation Date January 1,	Active Members: Defined Benefit	Active Members: Cash Balance	Retirees	Beneficiaries	Deferred Pensions	Inactive Members	Total
2018	7,868	1,387	5,307	599	1,090	35	16,286
2017	7,728	1,303	5,099	600	1,150	28	15,908
2016	7,698	1,274	4,784	576	1,173	7	15,512
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

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

SECTION V – ACCOUNTING AND FINANCIAL STATEMENT INFORMATION

The table below is a schedule of the total membership over the last four years.

Table V-6
Schedule of Total Membership and Salary

	As of January 1[a] 2018	2017	2016	2015
a. Retirees currently receiving benefits	5,307	5,099	4,784	4,566
b. Beneficiaries currently receiving benefits	599	600	576	542
c. Terminated vested employees entitled to future benefits from Defined Benefit Plans	797	834	872	779
d. Terminated non-vested employees entitled to contribution refunds from Defined Benefit Plans	35	28	7	8
e. Active employees in defined benefit plans	7,868	7,728	7,698	7,580
i. Aggregate Salary[b]	$434,554,380	$422,621,214	$394,133,120	$384,270,155
ii. Vested[c]	4,553	4,573	4,676	4,726
iii. Non-vested	3,315	3,156	3,022	2,854
f. Participants in cash balance plans	1,680	1,619	1,575	1,462
i. Aggregate Salary	$60,013,152	$53,998,354	$51,642,049	$47,537,851
ii. Active	1,387	1,303	1,274	1,214
iii. Inactive	293	316	301	248

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

[b] *Annualized salary paid during the prior plan year for Traditional Defined Benefit plan participants and actual salary for active cash balance participants*

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

APPENDIX A – MEMBERSHIP INFORMATION

Distribution of All Active Members by Age and Service as of January 1, 2018

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	2	0	0	0	0	0	0	11
20 to 24	122	71	38	27	3	1	0	0	0	0	262
25 to 29	142	141	111	125	80	5	0	0	0	0	604
30 to 34	116	105	94	128	202	89	5	0	0	0	739
35 to 39	102	80	81	119	195	191	83	1	0	0	852
40 to 44	75	60	81	96	184	188	167	49	1	0	901
45 to 49	87	88	75	107	210	207	233	150	78	5	1,240
50 to 54	81	83	70	132	204	240	235	176	174	77	1,472
55 to 59	61	69	60	114	188	238	226	168	169	237	1,530
60 to 64	35	40	30	79	150	181	181	143	123	215	1,177
65 & up	10	23	6	33	70	72	59	49	58	87	467
Total	840	760	646	962	1,486	1,412	1,189	736	603	621	9,255

APPENDIX A – MEMBERSHIP INFORMATION

Distribution of Active Defined Benefit Members by Age and Service as of January 1, 2018

COUNTS BY AGE/SERVICE

	Service										
Age	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	Total
Under 20	7	0	0	2	0	0	0	0	0	0	9
20 to 24	105	56	30	23	3	1	0	0	0	0	218
25 to 29	126	126	88	117	69	5	0	0	0	0	531
30 to 34	103	92	80	123	185	75	4	0	0	0	662
35 to 39	84	66	72	111	173	168	78	1	0	0	753
40 to 44	55	50	65	82	159	164	153	44	1	0	773
45 to 49	67	71	57	92	170	182	203	133	73	3	1,051
50 to 54	66	67	54	113	162	212	202	157	158	65	1,256
55 to 59	44	55	48	95	145	207	195	139	151	214	1,293
60 to 64	31	32	23	66	112	153	151	112	108	184	972
65 & up	6	20	6	25	50	60	46	36	43	58	350
Total	694	635	523	849	1,228	1,227	1,032	622	534	524	7,868

APPENDIX A – MEMBERSHIP INFORMATION

Distribution of Active Cash Balance Members by Age and Service as of January 1, 2018

COUNTS BY AGE/SERVICE

	Service										
Age	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	Total
Under 20	2	0	0	0	0	0	0	0	0	0	2
20 to 24	17	15	8	4	0	0	0	0	0	0	44
25 to 29	16	15	23	8	11	0	0	0	0	0	73
30 to 34	13	13	14	5	17	14	1	0	0	0	77
35 to 39	18	14	9	8	22	23	5	0	0	0	99
40 to 44	20	10	16	14	25	24	14	5	0	0	128
45 to 49	20	17	18	15	40	25	30	17	5	2	189
50 to 54	15	16	16	19	42	28	33	19	16	12	216
55 to 59	17	14	12	19	43	31	31	29	18	23	237
60 to 64	4	8	7	13	38	28	30	31	15	31	205
65 & up	4	3	0	8	20	12	13	13	15	29	117
Total	146	125	123	113	258	185	157	114	69	97	1,387

APPENDIX A – MEMBERSHIP INFORMATION

Pennsylvania Municipal Retirement System Distribution of Active Members by Age and Service as of January 1, 2018

AVERAGE SALARY BY AGE/SERVICE

	Service										
Age	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	Total
Under 20	$28,560	$0	$0	$65,623	$0	$0	$0	$0	$0	$0	$35,298
20 to 24	$35,728	$38,955	$39,434	$47,282	$61,354	$54,561	$0	$0	$0	$0	$38,696
25 to 29	$34,295	$40,739	$46,199	$52,881	$51,341	$51,537	$0	$0	$0	$0	$44,234
30 to 34	$42,912	$44,527	$50,246	$51,839	$55,870	$59,306	$66,293	$0	$0	$0	$51,295
35 to 39	$36,841	$46,203	$44,122	$53,210	$55,628	$62,963	$63,885	$78,613	$0	$0	$53,538
40 to 44	$37,560	$48,522	$45,269	$49,716	$53,483	$62,957	$66,565	$64,757	$63,456	$0	$55,713
45 to 49	$36,404	$45,005	$46,482	$48,799	$53,161	$57,926	$62,064	$67,179	$70,343	$67,203	$55,928
50 to 54	$43,036	$45,144	$47,613	$51,333	$51,132	$54,327	$56,970	$63,018	$69,072	$67,328	$56,041
55 to 59	$38,169	$49,420	$48,347	$50,210	$48,915	$53,674	$55,595	$59,368	$62,394	$64,192	$55,314
60 to 64	$34,681	$49,466	$51,515	$54,786	$48,962	$48,493	$54,735	$54,977	$58,398	$60,943	$53,732
65 & up	$31,831	$44,885	$48,910	$49,475	$46,009	$46,911	$50,083	$54,774	$53,053	$60,908	$51,156
Total	$37,562	$44,633	$46,670	$51,393	$52,235	$56,240	$58,894	$61,059	$63,637	$63,020	$53,438

APPENDIX A – MEMBERSHIP INFORMATION

Inactive Benefit Payment Distribution as of January 1, 2018

DEFINED BENEFIT PLANS

COUNTS BY BENEFIT/AGE: RECEIVING PAYMENTS

Age	Monthly Benefit	Count
x < 30	$3,525	5
30 <= x < 35	$3,935	4
35 <= x < 40	$4,833	12
40 <= x < 45	$8,744	18
45 <= x < 50	$36,735	49
50 <= x < 55	$199,100	132
55 <= x < 60	$682,987	377
60 <= x < 65	$1,721,765	1,055
65 <= x < 70	$2,197,478	1,435
70 <= x < 75	$1,405,101	1,159
75 <= x < 80	$792,669	735
80 <= x < 85	$456,725	487
85 <= x	$325,834	438
<Total>	$7,839,431	5,906

COUNTS BY BENEFIT/AGE: DEFERRED PAYMENTS

Age	Monthly Benefit	Count
x < 30	$1,491	6
30 <= x < 35	$9,382	21
35 <= x < 40	$33,149	47
40 <= x < 45	$62,461	76
45 <= x < 50	$151,860	146
50 <= x < 55	$189,810	196
55 <= x < 60	$216,883	209
60 <= x < 65	$54,543	84
65 <= x < 70	$3,699	8
70 <= x < 75	$0	0
75 <= x < 80	$128	1
80 <= x < 85	$376	2
85 <= x	$395	1
<Total>	$724,179	797

Deferred payments listed above are attributable to the non-cash balance defined benefit plans only. Deferred payments to the 293 cash balance participants will be determined upon their retirement.

APPENDIX A – MEMBERSHIP INFORMATION

Pensions in Payment on January 1, 2018 by Type and Amount

		Pension Type				
Monthly Amount	Total	Normal	Involuntary early	Voluntary early	Service disability	Non-service disability
Total	5,906	5,045	256	499	34	72
Under $100	275	243	22	8	1	1
$ 100 - $199	338	283	40	14	1	0
200 - 299	319	253	39	27	0	0
300 - 399	319	261	28	28	1	1
400 - 499	318	268	21	25	2	2
500 - 599	325	270	15	31	1	8
600 - 699	266	217	15	30	2	2
700 - 799	259	205	15	35	0	4
800 - 899	257	209	11	25	1	11
900 - 999	237	187	8	27	5	10
1,000 - 1,199	484	396	16	56	4	12
1,200 - 1,399	369	302	4	53	4	6
1,400 - 1,599	321	274	5	30	6	6
1,600 - 1,799	247	218	6	22	0	1
1,800 - 1,999	231	200	5	23	1	2
2,000 - 2,199	202	181	2	16	1	2
2,200 - 2,399	184	170	2	11	1	0
2,400 - 2,599	152	140	0	10	1	1
2,600 - 2,799	122	112	1	6	1	2
2,800 - 2,999	105	103	0	1	0	1
3,000 - 3,499	235	222	1	11	1	0
3,500 - 3,999	147	141	0	6	0	0
4,000 and over	194	190	0	4	0	0

APPENDIX A – MEMBERSHIP INFORMATION

Pensions Awarded in Prior Ten Years, by Type and Monthly Amount

	Total		Normal		Involuntary early		Voluntary early		Disability	
Year Ended December 31:	Number	Average Monthly Amount	Number	Average Monthly Amount	Number	Average Monthly Amount	Number	Average Monthly Amount	Number*	Average Monthly Amount
2008	271	1,157	223	1,150	7	843	36	1,259	5 (3)	1,162
2009	296	1,336	249	1,412	17	339	26	1,300	4 (0)	1,067
2010	396	1,552	341	1,632	13	364	37	1,250	5 (0)	1,407
2011	438	1,367	352	1,496	37	459	40	1,180	9 (3)	888
2012	390	1,370	341	1,421	20	520	22	1,614	7 (2)	709
2013	431	1,706	364	1,800	17	905	34	1,280	16 (2)	1,319
2014	392	1,492	341	1,524	14	825	29	1,575	8 (2)	1,022
2015	339	1,574	309	1,593	4	562	22	1,569	4 (2)	1,113
2016	447	1,562	397	1,600	11	627	28	1,428	11 (3)	1,485
2017	383	1,576	342	1,616	8	822	29	1,350	4 (1)	1,311

*Number of service-related disability pensions are shown in parentheses.

APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

Actuarial Assumptions:

The PMRS demographic actuarial assumptions were most recently revised by the Board effective January 1, 2016, while the Regular Interest Rate (investment return assumption) was most recently approved by the Board effective January 1, 2017 with no changes for the January 1, 2018 valuation:

A. Healthy Life Mortality:

Rates of Pre-Retirement Mortality
Males: RP 2000 Non-Annuitant Male table projected 15 years with Scale AA
Females: RP 2000 Non-Annuitant Female table projected 15 years with Scale AA, setback five years

Rates of Post-Retirement Mortality
Males: RP2000 Annuitant Male table projected 5 years with Scale AA
Females: RP2000 Annuitant Female table projected 10 years with Scale AA

Based on the information provided by PMRS and review of the actual mortality experience over a five-year period, these mortality tables provide projected mortality improvements for the future. Given that experience analysis is required to be performed every four years the projection periods are sufficient to reflect anticipated improvements until the next study is performed.

Service Related Mortality: 15% for municipal plans and 50% for uniform plans

B. Disabled Life Mortality Rates:
Males and females: RP 2000 with 10 year set forward

C. Termination Rates Before Retirement
Rates based on the number of active members in the pension plan, years of service, and the type of plan participants (non-uniform or uniform).

Municipal Participants (Non-Uniform)		
	Number of Active Members in Plan	
Service	<25	25+
<1	15.0%	18.0%
1	15.0%	18.0%
2	11.0%	14.0%
3	8.0%	12.0%
4	7.0%	9.0%
5	6.0%	9.0%
6	5.5%	8.0%
7	5.5%	7.5%
8	5.5%	6.5%
9	4.0%	5.0%
10+	2.5%	4.0%

APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

Uniform Participants		
	Number of Active Members in Plan	
Service	<25	25+
<1	12.0%	13.0%
1	12.0%	10.0%
2	12.0%	7.0%
3	9.0%	7.0%
4	7.0%	6.0%
5	5.0%	5.0%
6	5.0%	4.0%
7	5.0%	3.0%
8	4.5%	3.0%
9	4.0%	3.0%
10+	3.0%	3.0%

D. Disability Incidence Rates:

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

Age	Rate
25	0.014%
35	0.029%
45	0.064%
55	0.134%
65	0.658%

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

Age	Rate
25	0.031%
35	0.058%
45	0.136%
55	0.335%
65	1.123%

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.

APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

F. Salary Scale:

Age	Total Rate[1] (including inflation)
25	7.05%
30	5.44%
35	4.55%
40	4.26%
45	3.97%
50	3.72%
55	3.44%
60	3.28%
65	2.80%

[1]Add 2% for each of the first three years of service and additional 6% increase in year prior to normal retirement age

G. Rates of Retirement:

Municipal Members:

Members are assumed to retire over a range of ages as shown below.

Age	Rate[1]
<45	2%
45	8%
46	10%
47 – 50	15%
51 – 54	17%
55	22%
56 – 59	14%
60 – 64	18%
65	25%
66 – 74	20%
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.

APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

Uniform Members:

Members are assumed to retire over a range of ages as shown below.

Age	Rate
<49	0%
50	30%
51 – 54	10%
55	25%
56 – 58	20%
59 – 60	15%
61	20%
62	30%
63 – 64	20%
65	30%
66+	100%

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

80% of active members are assumed to be married for retirees with the 50% Joint and Survivor form of payment. Male spouses are assumed to be three years older than female spouses.

I. Social Security Projections (if applicable):

(a) The Social Security Taxable Wage Base will increase by 3.3% compounded annually;

(b) The Consumer Price Index will increase 2.8% compounded annually; and

(c) The Average Total Wages of All Workers will increase by 3.3% compounded annually.

J. Post-Retirement Cost of Living Increases (if applicable)/Inflation: 2.8% per year, subject to plan limitations.

K. Investment Return Assumption for municipal assets (Regular Interest Rate):

5.25% compounded annually (net of investment and certain administration expenses) for funding purposes.

L. Administrative Expenses

System-wide Actuarial Value of Assets: The expense assumption is based on the previous year's actual expenses increased by 5%.

Municipalities: The expense assumption is based on the expected expenses for the current year, as reported on the Act 205 forms.

Rationale for Assumptions: An experience study is completed every four years for the System. The assumptions outlined above were reviewed and adopted by the Board based on the most recent experience study for the period covering January 1, 2009 – December 31, 2013.

APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

Actuarial Methods:

Contribution requirements are individually determined for each participating municipality, on an actuarial basis as described below in the Funding of the Unfunded Actuarial Liability section, 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 (AVA):

Sum of all audited reserve accounts as of the valuation date, including Member, Municipal, Retired, Disability, and DROP Reserves, as provided in the December 31, 2017 CAFR, and a one-year administration expense reserve, plus any additional adjustments as made during the year by the Board of Trustees without reflecting any Excess Interest. This amount will be incorporated in the 2019 valuation once the type and amount of distribution to each plan has been determined.

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 value of assets 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.

The Actuarial Value of Assets are set equal to reserves under the System based on the unique legislative structure of PMRS, which are increased annually at a rate agreed on by the Board named "Regular Interest" as defined under the Pennsylvania Municipal Retirement Law. Therefore, these assets 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:

> *"…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.*

APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

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 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 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.

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 for each plan 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 for retired members (if local benefit changes); or

APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

(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.

If a plan is in a surplus position, then 10% of the surplus is credited against the aggregate cost of the plan.

Method to Roll Forward Liabilities:

The defined benefit pension plans for county plans and cash balance plans are valued explicitly every even calendar year (cash balance plans are valued every year). However, the liabilities for those plans that are neither county nor cash balance are explicitly valued every odd calendar year. For the even calendar years, we estimate those Plan liabilities by rolling forward the prior year's liabilities. With the implementation of GASB 68, which required an individual report to be issued for each pension plan, the liabilities for those plans that are neither county or cash balance (i.e. municipal or authority defined benefit plans) were rolled forward based on the actual benefit payments. These liabilities reflect any material changes to the liabilities that may have occurred since the prior actuarial valuation. These rolled forward liabilities have been reflected in this report. The liabilities for all participants in pay status for these municipal pension plans are explicitly valued every year. The roll forward active and deferred vested liabilities were proportionally adjusted based on the prior year liabilities net of in pay status liabilities.

All other liabilities for the county and cash balance plans were explicitly valued as of January 1, 2018 based on the data, plan provisions, methods and assumptions.

Changes in Actuarial Assumptions and Methods: None.