GRS Gabriel Roeder Smith & Company
Consultants & Actuaries

MICHIGAN PUBLIC SCHOOL EMPLOYEES' RETIREMENT SYSTEM

ANNUAL ACTUARIAL VALUATION REPORT
SEPTEMBER 30, 2016

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March 24, 2017

Retirement Board
Michigan Public School Employees' Retirement System
530 W. Allegan
Lansing, Michigan 48909

Re: Michigan Public School Employees' Retirement System - Actuarial Valuation as of September 30, 2016

Dear Board Members:

The results of the September 30, 2016 annual actuarial valuation of the Michigan Public School Employees' Retirement System pension benefits are presented in this report. The purpose of the valuation was to measure the System's funding progress, to determine the employer contribution for the 2018-2019 fiscal year, and to provide actuarial information in connection with the applicable Governmental Accounting Standards Board Statements. The report should not be relied upon for any other purpose. This report may be provided to parties other than the Office of Retirement Services only in its entirety and only with the permission of the Office of Retirement Services. GRS is not responsible for unathorized use of this report.

The valuation was based upon information, furnished by the Office of Retirement Services, concerning Retirement System benefits, financial transactions, and active members, terminated members, retirees and beneficiaries. Data was checked for internal and year-to-year consistency, but was not audited by us. As a result, we are unable to assume responsibility for the accuracy or completeness of the data provided. Year 2005 and prior years' valuation results back to 1993 were not prepared by GRS and are presented for comparison with the current year's results.

The valuation summarized in this report involves actuarial calculations that require making assumptions about future events. We believe that the assumptions and methods used in this report are reasonable and appropriate. However, other assumptions and methods could also be reasonable and could result in materially different results. Some of the numbers in this report are rounded. The use of the rounded numbers for plan liabilities should not imply a lack of precision. In addition, because it is not possible or practical to consider every possible contigency, we may use summary information, estimates or simplifications or calculations to facilitate the modeling of future events. We may also exclude factors or data that we deem to be immaterial.

Future actuarial measurements may differ significantly from those presented in this report due to such factors as experience differing from that anticipated by actuarial assumptions, changes in plan provisions, actuarial assumptions/methods or applicable law. Due to the limited scope of this assignment, we did not perform an analysis of the potential range of future measurements. This valuation was based on the assumption that the plan sponsor will continue to be able to make any contribution necessary to fund the plan in the future. A determination of the plan sponsor's ability to make the necessary contributions in the future is beyond the scope of our expertise and was not performed by us.

To the best of our knowledge, this report is accurate and fairly presents the actuarial position of the Retirement System. The valuation was conducted in accordance with standards of practice prescribed by the Actuarial Standards Board and in compliance with the applicable state statutes. Mita D. Drazilov and Louise M. Gates are independent of the plan sponsor and are Members of the American Academy of Actuaries (MAAA) who meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein. It is our opinion that the actuarial assumptions used for the valuation produce results which are reasonable.

Sincerely,

Mita Drazilov

Mita D. Drazilov, ASA, FCA, MAAA

Louise Gates

Louise M. Gates, ASA, MAAA

MDD/LMG:dj

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1. Required Employer Contributions to Support Retirement Benefits

The computed employer contribution for fiscal year 2019 is shown below. Computed contributions are shown as a percentage of active member payroll and as the projected fiscal year 2019 dollar amount.

	Total Computed Employer Contribution		
	Non-Hybrid Members	Hybrid (PPP) Members	Weighted Average
As a Percentage of Active Member Payroll			
Normal Cost	4.86 %	3.05 %	4.46 %
UAAL Amortization Payment	24.01	24.01	24.01
As an Annual Dollar Amount			
Normal Cost	$ 330,527,437	$ 59,790,429	$ 390,317,866
UAAL Amortization Payment	1,661,478,420	516,806,310	2,178,284,730
Total	$ 1,992,005,857	$ 576,596,739	$ 2,568,602,596

This valuation report establishes the employer contribution for fiscal year 2019. As a result of Public Act 300 of 2012 and the introduction of the defined contribution (DC) plan option, the employer normal cost rate (i.e., 4.46%) is expressed as a percentage of the defined benefit (DB) plan payroll, while the UAAL amortization payment rate (i.e., 24.01%) is expressed as a percentage of total payroll (i.e., including both DB and DC plan active member payroll).

2. Public Act 300 of 2012

A brief summary of the plan changes resulting from Public Act 300 of 2012 follows:

Basic and MIP active members were given the following options to increase, maintain, or cease their contributions to the pension plan:

(1) Increase their member contribution rate to the pension fund and maintain the 1.5% benefit multiplier in their pension formula for service accrued after the transition date (i.e., February 1, 2013). Basic member contributions increased to 4% (from 0%). MIP member contributions increased to a flat 7% (from 3.9% for MIP-Fixed, from a graded percentage up to 4.3% for MIP-Graded, and from a graded percentage up to 6.4% for MIP-Plus).

EXECUTIVE SUMMARY/BOARD SUMMARY

(2) Increase their member contribution rate (as noted above) and maintain the 1.5% benefit multiplier in their pension formula for service accrued after the transition date until they reach 30 years of service. Upon reaching 30 years of service, their member contribution rate would return to their current level (pre-Public Act 300 of 2012), and their pension formula for service in excess of 30 years would be based upon a 1.25% benefit multiplier.

(3) Maintain their current member contribution rate to the pension fund. The pension formula for years of service before the transition date is based upon a 1.5% benefit multiplier, while the pension formula for years of service after the transition date is based upon a 1.25% benefit multiplier.

(4) Cease member contributions to the DB portion of the pension fund. In this circumstance, the member would no longer receive future benefit accruals in the DB plan and would become a participant in the DC plan. The pension formula for years of service before the transition date is based upon a 1.5% benefit multiplier. The member's final average compensation would be frozen as of the transition date.

Members who did not make an election before the deadline were deemed to have elected Option (3), maintain their current member contribution rate and receive future accruals based upon a 1.25% benefit multiplier. There was no change in pension benefits to Pension Plus Plan (PPP) members. New members will have the option of electing between the PPP and the DC plan. The distribution of option elections for the total active membership (DB plus DC) as of September 30, 2016 is presented below:

Option 1 - Increase member contributions / 1.5% benefit multiplier after transition date	21 %
Option 2 - Increase member contributions and 1.5% benefit multiplier until 30 years of service	2
Option 3 - Current member contributions / 1.25% benefit multiplier after transition date	49
Option 4 - Cease DB member contributions / DC benefit after transition date	2
Option 5 - Not eligible to make an election or new hire who elected PPP	21
Option 6 - New hire who elected pure DC plan	5

An additional provision of Public Act 300 of 2012 is that the impact of the Early Retirement Incentive (ERI) program of 2010 will be re-amortized over a 10-year period, rather than a 5-year period.

It is our understanding that the plan changes first affected the fiscal year 2014 budgeted employer contribution rates.

EXECUTIVE SUMMARY/BOARD SUMMARY

3. Budgeting Process and Reconciliation Process

For the September 30, 2011 valuation and prior valuations, an Annual Required Contribution (ARC) for Governmental Accounting Standards Board (GASB) accounting purposes and the required employer contribution for funding purposes were established for the fiscal year following the valuation date. For example, the September 30, 2011 valuation established an ARC and the required employer contribution for funding purposes for fiscal year 2012. However, the 2011 valuation was used for fiscal year 2014 budgeting purposes. Any differences between the required and budgeted employer contribution were handled through a reconciliation process, as established through subsection 41(9) of the MPSERS statute.

Beginning with the September 30, 2012 valuation, it had been reported to the actuary that the reconciliation process had been suspended. The September 30, 2012 valuation determined the required contribution for fiscal year 2015 for funding and accounting purposes. For the September 30, 2015 valuation, it was reported to the actuary that the reconciliation process has been reinstated with reconciliation payments beginning in fiscal year 2016. The September 30, 2016 valuation determines the required employer contribution for fiscal year 2019 for both funding and accounting purposes.

The contribution requirements calculated in this report are in addition to any reconciliation payments as required by subsetction 41(9) of MPSERS statute.

4. Contribution Comparison

The chart below compares the results of this valuation of the Retirement System with the results of the prior year's valuation:

Valuation Date	9/30/2015	9/30/2016
Contribution Percentage		
Normal Cost	3.60 %	4.46 %
UAAL Amortization Payment	22.18	24.01
Total	N/A	N/A
As an Annual Dollar Amount		
Normal Cost	$ 320,213,722	$ 390,317,866
UAAL Amortization Payment	2,026,446,895	2,178,284,730
Total	$ 2,346,660,617	$ 2,568,602,596
Fiscal Year Computed For	2018	2019
Fiscal Year Budgeted For	2018	2019

EXECUTIVE SUMMARY/BOARD SUMMARY

5. Reasons for Change

There are three general reasons why contribution rates change from one valuation to the next. The first is a change in the benefits or eligibility conditions of the plan. The second is a change in the valuation assumptions used to predict future occurrences and/or a change to the valuation methods. The third is the difference during the year between the plan's actual experience and what the assumptions predicted.

There were no benefit changes reported to the actuary for the year ended September 30, 2016. In accordance with directions provided by the Office of Retirement Services, the investment return assumption for Non-Hybrid liabilities was lowered from 8.00% to 7.50%. This resulted in an increase in liabilities and employer contribution requirements. This was offset in part by plan experience for the year ended September 30, 2016 which was overall favorable and is described in more detail in Section B of this report.

SECTION A
INTRODUCTION

CONTRIBUTION REQUIREMENTS

Development of Employer Contributions for the Indicated Valuation Date

		September 30			
		2015	2016		
	Contributions for	**Total**	**Non-Hybrid**	**Hybrid (PPP)**	**Total**
(1)	Fiscal Year Ending September 30,	2018	2019	2019	2019
(2)	Total Normal Cost of Benefits (as a % of member pay)	8.29%	9.55%	7.94%	9.19%
(3)	Member Contribution % (weighted average)	4.69%	4.69%	4.89%	4.73%
(4)	Employer Normal Cost % = (2) - (3)	3.60%	4.86%	3.05%	4.46%
(5)	Projected Active Member Payroll for Fiscal Year - Normal Cost $	$ 8,864,012,151	$ 6,800,976,065	$ 1,960,341,948	$ 8,761,318,013
(6)	Employer Normal Cost $ = (4) x (5)	320,213,722	330,527,437	59,790,429	390,317,866
(7)	Total Accrued Liability	67,727,577,579			72,310,445,826
(8)	Funding Value of Assets	41,006,352,969			43,203,593,340
(9)	Unfunded Actuarial Accrued Liabilities (UAAL) = (7) - (8)	$ 26,721,224,610			$ 29,106,852,486
	a. Present Value of Budgeted Early Retirement Incentive Payments	218,973,958			218,442,689
	b. Present Value of Remaining Early Retirement Incentive Payments	470,800,453			388,993,550
	c. Present Value of Future Reconciliation Payments	495,118,834			565,526,993
	d. Net UAAL to be Amortized = (9) - (9a) - (9b) - (9c)	$ 25,536,331,365			$ 27,933,889,254
(10)	Amortization Period (years)	21	20	20	20
(11)	Amortization Factor (level percent of payroll payments)		13.78178608	14.36034438	
(12)	Amortization Payment %	20.82%	22.65%	22.65%	22.65%
(13)	Early Retirement Incentive Amortization Payment %	1.36%	1.36%	1.36%	1.36%
(14)	Total Amortization Payment % = (12) + (13)	22.18%	24.01%	24.01%	24.01%
(15)	Projected Active Member Payroll for Fiscal Year - Amortization $ [(1)]	$ 9,136,370,130	$ 6,919,943,440	$ 2,152,462,767	$ 9,072,406,207
(16)	Amortization Payment $ = (14) x (15) [(2)]	2,026,446,895	1,661,478,420	516,806,310	2,178,284,730
(17)	Total Computed Employer Contribution $ = (6) + (16)	**$2,346,660,617**	**$1,992,005,857**	**$ 576,596,739**	**$2,568,602,596**

[(1)] *The Non-Hybrid projected amortization payroll includes projected payroll for those members with a Non-Hybrid liability, regardless of whether the active member is continuing to accrue a Non-Hybrid benefit. The Hybrid projected amortization payroll includes projected payroll for all Hybrid and "pure" DC members.*

[(2)] *See page A-3 for a description of how to allocate the Amortization Payment dollars between the Non-Hybrid and Hybrid assets.*

CONTRIBUTION REQUIREMENTS

Computed Employer Contributions

Based on the assumptions outlined in Section E, as more of the active membership becomes Pension Plus Plan – Hybrid Plan members and the System pays off its unfunded actuarial accrued liability (UAAL), the long term employer contribution rate for the Michigan Public School Employees' Retirement System is expected to be the long term employer normal cost rate for the Pension Plus Plan – Hybrid Plan. However, for the current total defined benefit MPSERS active member population, the weighted average normal cost rate is 4.46%. Also, for the current year, there is a contribution needed to fund the UAAL. As the normal cost rate and the UAAL amortization payment rate are applied to different payrolls, the two contribution rates cannot be summed to get a total recommended employer contribution rate.

Effect of 2010 Early Retirement Incentive Program

For fiscal year 2019, the amortization payment will include 1.36% of total fiscal year payroll, attributable to the Early Retirement Incentive Program (as shown on page A-1).

Determining Employer Dollar Contributions

For any period of time, the percent-of-payroll contribution rate needs to be converted to dollars, then promptly contributed to the System. Please note, the normal cost rates and the UAAL amortization payment rates apply to two different types of payroll. The normal cost rates should be applied to the fiscal year 2019 payroll for those active employees who elected to maintain future benefit accruals in the defined benefit plan, while the UAAL amortization payment rates should be applied to the fiscal year 2019 payroll for the entire MPSERS active employee group.

For the Non-Hybrid Plan members, the employer normal cost rate (expressed as a % of the Non-Hybrid defined benefit participating active member payroll reported for this valuation) is 4.86%. Applying the employer normal cost rate of 4.86% to the projected payroll for MPSERS active employees participating in the Non-Hybrid portion of the defined benefit plan for fiscal year 2019 produces annual employer normal cost contributions of $330,527,437.

For the Hybrid Plan members, the employer normal cost rate (expressed as a % of the Hybrid defined benefit participating active member payroll reported for this valuation) is 3.05%. Applying the employer normal cost rate of 3.05% to the projected payroll for MPSERS active employees participating in the Hybrid portion of the defined benefit plan for fiscal year 2019 produces annual employer normal cost contributions of $59,790,429.

CONTRIBUTION REQUIREMENTS

The amortization payment for funding the UAAL (expressed as a % of the total MPSERS active member payroll reported for this valuation) is 24.01%. Applying the amortization payment rate of 24.01% to the projected payroll for the total MPSERS active employees for fiscal year 2019 produces an annual amortization payment of $2,178,284,730.

The sum of the two normal cost contributions and the amortization payment yields an expected total employer contribution of $2,568,602,596 for fiscal year 2019. Currently, the non-investment cash flow is tracked separately in the assets for the Non-Hybrid and Hybrid groups. The normal cost contributions should be allocated to each of the respective groups as expected, based on the actual payroll amounts. For the amortization payment of the UAAL, $(14,173) should be allocated to the Hybrid group, and $2,178,298,903 should be allocated to the Non-Hybrid group. The negative amortization payment to the Hybrid group implies that the normal cost contribution attributable to the Hybrid group can be reduced by the amount of overfunded amortization credit.

Reconciliation Payments

For the September 30, 2015 valuation, it was reported to the actuary that the reconciliation process has been reinstated. The contribution requirements shown on page A-1 for fiscal year 2019 are needed in addition to the reconciliation payments required by subsection 41(9) of the MPSERS statute. The scheduled reconciliation payments were prepared and reported by the Office of Retirement Services (ORS) and are presented on page E-13.

SUMMARY OF PLAN CHANGES - PUBLIC ACT 300 OF 2012

A brief summary of the plan changes resulting from Public Act 300 of 2012 follows:

Basic and MIP active members were given the following options to increase, maintain, or cease their contributions to the pension plan:

(1) Increase their member contribution rate to the pension fund and maintain the 1.5% benefit multiplier in their pension formula for service accrued after the transition date (i.e., February 1, 2013). Basic member contributions increased to 4% (from 0%). MIP member contributions increased to a flat 7% (from 3.9% for MIP-Fixed, from a graded percentage up to 4.3% for MIP-Graded, and from a graded percentage up to 6.4% for MIP-Plus).

(2) Increase their member contribution rate (as noted above) and maintain the 1.5% benefit multiplier in their pension formula for service accrued after the transition date until they reach 30 years of service. Upon reaching 30 years of service, their member contribution rate would return to their current level (pre-Public Act 300 of 2012), and their pension formula for service in excess of 30 years would be based upon a 1.25% benefit multiplier.

(3) Maintain their current member contribution rate to the pension fund. The pension formula for years of service before the transition date is based upon a 1.5% benefit multiplier, while the pension formula for years of service after the transition date is based upon a 1.25% benefit multiplier.

(4) Cease member contributions to the DB portion of the pension fund. In this circumstance, the member would no longer receive future benefit accruals in the DB plan and would become a participant in the DC plan. The pension formula for years of service before the transition date is based upon a 1.5% benefit multiplier. The member's final average compensation would be frozen as of the transition date.

Members who did not make an election before the deadline were deemed to have elected Option (3), maintain their current member contribution rate and receive future accruals based upon a 1.25% benefit multiplier. There was no change in pension benefits to Pension Plus Plan (PPP) members. New members will have the option of electing between the PPP and the DC plan.

An additional provision of Public Act 300 of 2012 is that the impact of the Early Retirement Incentive (ERI) program of 2010 will be re-amortized over a 10-year period, rather than a 5-year period. It is our understanding that the plan changes first affect the fiscal year 2014 budgeted employer contribution rates.

DISCUSSION OF CHANGES

Revisions in Benefits

There have been no material revisions in benefits since the last annual actuarial valuation.

Revisions in Actuarial Assumptions or Methods

In accordance with directions provided by the Office of Retirement Services, the Non-Hybrid plan investment return assumption was lowered from 8.00% to 7.50% effective with this valuation of MPSERS. This assumption change increased the Actuarial Accrued Liability by $3.5 billion.

Actuarial Experience

Actuarial Experience was more favorable than that anticipated by the actuarial assumptions. The total actuarial gain was $1.1 billion. The gain was due primarily to the phase-in of investment experience over the past few years.

Comment on the Investment Markets

Investment markets continue to be volatile. The actuarial value of assets (funding value), used to determine both the funded status and the required employer contribution, is based on a 5-year smoothed value of assets. This reduces the volatility of the valuation results.

As of September 30, 2016, the actuarial value of assets was 99% of market value. This means that meeting the actuarial investment return assumption in the next few years will not require average future market returns to exceed the 7.5% investment return assumption.

If the September 30, 2016 valuation results were based on the market value of assets instead of the actuarial value of assets, the funded percent of the plan would be 60.1% (instead of 59.7%), and the UAAL amortization payment would be 23.77% of payroll (instead of 24.01%).

MEASURES OF FINANCIAL SOUNDNESS

The purpose of this section of the report is to provide certain measures which indicate the financial soundness of the program. These measures relate to long term solvency and level funding.

The various percentages listed in this section as of a single valuation date are not overly significant standing alone. What is more significant is the trend of the rates over a period of years. It is also important to keep in mind that each time benefits or assumptions are revised, actuarial liabilities are created or diminished. Any newly created liabilities are financed systematically over a period of future years. All actuarially computed values in this analysis are based on the actuarial assumptions utilized in the respective years' actuarial valuations.

Long Term Solvency

Over the longer term, the solvency of an ongoing plan can be measured by comparing the actuarial value of assets to an amount known as the Actuarial Accrued Liability (AAL) under the Entry-Age actuarial cost method. This item has often been called the "past service liability." The AAL is affected immediately by any revisions in benefits or assumptions. The accumulation of assets to equal the AAL can be considered a long range funding goal. Largely because of periodic benefit increases, very few retirement programs have attained this goal.

Valuation Date	Actuarial Value of Assets	Actuarial Accrued Liability	% of AAL Covered by Assets
9/30/2016 [1]	$43,203,593,340	$72,310,445,826	59.7 %
9/30/2016	43,203,593,340	68,858,082,735	62.7
9/30/2015	41,006,352,969	67,727,577,579	60.5

[1] *Revised actuarial assumptions and/or methods.*

The chart above illustrates the change in the total System funding percent since the prior year. Page B-7 shows the funded percent in greater detail and for a longer period of time. In particular, the funded percent for current benefit recipients is 75.1% as of September 30, 2016.

MEASURES OF FINANCIAL SOUNDNESS

Level Contributions

The actuarial assumptions and cost method have been chosen with the intent of producing required total contributions which are expected to remain fairly level as a percentage of active member payroll. The following chart shows a brief history of contribution rates:

Valuation Date	Fiscal Year Budgeted For	Normal Cost [3]	Amortization Payment	Total Contribution
9/30/2016 [1]	2019	4.46 %	24.01 %	N/A [2]
9/30/2016	2019	3.59	21.91	N/A [2]
9/30/2015	2018	3.60	22.18	N/A [2]

[1] *Revised actuarial assumptions and/or methods.*

[2] *Effective with Public Act 300 of 2012, the normal cost rate and the amortization payment rate are applied to different payrolls and can no longer be added together for a total contribution rate.*

[3] *Normal cost is a weighted average rate of the Non-Hybrid and Hybrid normal cost rates.*

A major factor affecting the stability of the contribution requirements just shown is how well the actual plan experience compares to the actuarial assumptions. The value of the difference between what actually occurred and what was assumed to occur is called the actuarial gain or loss. Gains tend to lower the subsequent contribution requirements of the program while losses tend to cause subsequent contribution requirements to rise.

Year Ending	Actuarial Gain/(Loss)
9/30/2016	$ 1,108,274,408
9/30/2015	111,195,478

Analysis of all the benchmarks noted, over a period of years, will provide an indication of whether the program is becoming financially stronger or weaker.

OTHER OBSERVATIONS

General Implications of Contribution Allocation Procedure or Funding Policy on Future Expected Plan Contributions and Funded Status

Given the plan's contribution allocation procedure, if all actuarial assumptions are met (including the assumption of the plan earning 7.5% on the Non-Hybrid actuarial value of assets and 7.0% on the Hybrid actuarial value of assets), it is expected that:

(1) The employer normal cost as a percentage of pay will decrease to the level of the Hybrid normal cost rate as the Non-Hybrid population declines and is replaced by Hybrid members,
(2) The amortization payment as a percentage of pay will remain level through fiscal year 2022 (when the Early Retirement Incentive is fully amortized), decrease by 1.36%, and remain level through fiscal year 2038. In determining the amortization payment schedule, the amortization payments are expected to increase at the payroll growth assumption regardless of whether the payroll actually grows at that assumption. Stated another way, to finance the existing UAAL based upon current amortization policy, *the amortization payment dollar amounts have to grow at the payroll growth assumption*,
(3) The unfunded actuarial accrued liability will be fully amortized at the end of fiscal year 2038, and
(4) The funded status of the plan will increase gradually towards a 100% funded ratio.

When selecting a contribution allocation procedure, the following three items should be considered, including the balance amongst the three items:

(1) Benefit security,
(2) Intergenerational equity, and
(3) Contribution stability and predictability.

Generally, given the nature of public employee retirement systems (e.g., level contribution financing objective and perceived ongoing nature of the plan or plan sponsor), intergenerational equity and contribution stability and predictability have received more consideration than benefit security when contribution allocation procedures are selected. However, given the importance of benefit security to any retirement system, we suggest that contributions to the System in excess of those presented in this report be considered.

OTHER OBSERVATIONS (CONCLUDED)

Limitations of Funded Status Measurements

Unless otherwise indicated, a funded status measurement presented in this report is based upon the actuarial accrued liability and the actuarial value of assets. Unless otherwise indicated, with regards to any funded status measurements presented in this report:

(1) The measurement is inappropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the plan's benefit obligations. In addition, the measurement is inappropriate for assessing benefit security for the membership.

(2) The measurement is dependent upon the actuarial cost method which, in combination with the plan's amortization policy and asset valuation method, affects the timing and amounts of future contributions. The amounts of future contributions will most certainly differ from those assumed in this report due to future actual experience differing from assumed experience based upon the actuarial assumptions. A funded status measurement in this report of 100% is not synonymous with no required future contributions. If the funded status were 100%, the plan would still require future normal cost contributions (i.e., contributions to cover the cost of the active membership accruing an additional year of service credit).

(3) The measurement would produce a different result if the market value of assets were used instead of the actuarial value of assets, unless the market value of assets is used in the measurement.

RESERVE TRANSFER

In accordance with Section 35 of the MPSERS statute (Act 300 of the Public Acts of 1980, as amended), we have calculated the actuarial present value of retirement allowances currently in payment status as of September 30, 2016. The reported value of assets held in the Reserve for Retired Benefit Payments as of September 30, 2016 was provided by the Office of Retirement Services. This information is shown below. Since the value of retiree liabilities exceeds the value of assets held in reserve as of September 30, 2016, a transfer from the Reserve for Employer Contributions of $5,777,327,604 is required.

	As of September 30, 2016		
	Non-Hybrid	**Hybrid (PPP)**	**Total**
Retiree Liability	$ 49,299,329,446	$ 107,596	$ 49,299,437,042
Retiree Reserve	43,522,069,719	39,719	43,522,109,438
Difference	5,777,259,727	67,877	5,777,327,604

SECTION B

FUNDING RESULTS

PRESENT VALUE OF FUTURE BENEFITS AND ACCRUED LIABILITY

Determination of Unfunded Accrued Liability as of September 30, 2016

	Non-Hybrid	Hybrid (PPP)	Total
A. Accrued Liability			
1. For retirees and beneficiaries	$ 49,299,329,446	$ 107,596	$ 49,299,437,042
2. For vested and other terminated members [1]	1,902,076,914	20,273,544	1,922,350,458
3. For other inactive members [2]	102,443,221	0	102,443,221
4. For present active members			
a. Value of expected future benefit payments	26,468,929,137	1,281,337,352	27,750,266,489
b. Value of future normal costs	5,721,395,885	1,042,655,499	6,764,051,384
c. Active member accrued liability: (a) - (b)	20,747,533,252	238,681,853	20,986,215,105
5. Total accrued liability	72,051,382,833	259,062,993	72,310,445,826
B. Present Valuation Assets (Funding Value)	42,944,352,572	259,240,768	43,203,593,340
C. Unfunded Accrued Liability: (A.5) - (B)	29,107,030,261	(177,775)	29,106,852,486
D. Funding Ratio: (B) / (A.5)	59.6%	100.1%	59.7%

[1] *Starting with the September 30, 2015 valuation, pending refunds of employee contributions for former employees who terminated without a vested benefit will be summarized with the vested and other terminated members. Prior to the September 30, 2015 valuation, these liabilities were summarized with the active liability.*

[2] *Includes liabilities for employees who transferred to the DC pension plan in connection with PA 300.*

EXPERIENCE GAIN/(LOSS)

A. Derivation of Actuarial Gain/(Loss):	
1. Unfunded Actuarial Accrued Liability (UAAL) - Previous Valuation	$ 26,721,224,610
2. Total Normal Cost (employer plus member) for Year Ending 9/30/2016	691,998,863
3. Total Contributions (employer plus member) for Year Ending 9/30/2016	2,707,550,168
4. Interest on:	
a. UAAL: Discount Rate* x (1)	2,137,698,198
b. Normal Cost and Contributions: Discount Rate* / 2 x [(2) - (3)]	(80,607,700)
c. Net Total: (a) + (b)	2,057,090,498
5. Change in UAAL due to Benefit Changes	-
6. Change in UAAL due to Assumption Changes	3,452,363,091
7. Expected UAAL Current Year: (1) + (2) - (3) + (4c) + (5) + (6)	30,215,126,894
8. Actual UAAL Current Year	29,106,852,486
9. Experience Gain/(Loss): (7) - (8)	1,108,274,408
B. Approximate Portion of Gain/(Loss) due to Investments	989,208,595
C. Approximate Portion of Gain/(Loss) due to Liabilities: (A.9) - (B)	119,065,813

** Discount rate is 8% for Non-Hybrid group and 7% for the Hybrid group.*

The schedule above shows the net, aggregate experience for the System. The next page shows this experience in detail. Please note that row C above includes a refund of University employer contributions totaling $2,478,596.

DETAILED EXPERIENCE GAIN/(LOSS)

Gains/(Losses) During the Year Ended September 30, 2016
Resulting from Differences Between Assumed and Actual Experience

TYPE OF ACTIVITY

Type of Activity		Gain/(Loss)
1. **Retirements** (including disability retirement). If members retire at older ages or with lower final average pay than assumed, there is a gain. If younger ages or higher average pays, a loss.	$	14,789,483
2. **Withdrawal from Employment** (including death-in-service). If more liabilities are released by withdrawals and deaths than assumed, there is a gain. If smaller releases, a loss.		(55,443,358)
3. **Pay Increases.** If there are smaller pay increases than assumed, there is a gain. If greater increases, a loss.		290,614,529
4. **Investment Income.** If there is greater investment income than assumed, there is a gain. If less income, a loss.		989,208,595
5. **Death After Retirement.** If retirants and inactive vested members live longer than assumed, there is a loss. If not as long, a gain.		(82,164,182)
6. **Rehires.**		6,193,838
7. **Refund of University Employer Contributions.**		(2,478,596)
8. **Other.** Miscellaneous gains and losses resulting from data adjustments, timing of financial transactions, etc.		(52,445,901)
9. **Composite Gain/(Loss) During Year.**	$	1,108,274,408

EXPERIENCE GAIN/(LOSS)

Five-Year History
(Amounts Shown in Millions)

Plan Year Ending September 30	Experience Gain/(Loss)	Gain/(Loss) Due to Investments	Actuarial Value of Investments	Investment Gain/(Loss) as % of Assets
2016	$ 1,108	$ 989	$ 43,204	2.29%
2015	111	604	41,006	1.47
2014	1,084	1,047	39,626	2.64
2013	(399)	(861)	38,044	(2.26)
2012	(2,673)	(3,454)	38,450	(8.98)

Plan Year Ending September 30	Gain/(Loss) Due to Liabilities	Actuarial Accrued Liability	Liability Gain/(Loss) as % of Accrued Liability
2016	$ 119	$ 72,310	0.16%
2015	(493)	67,728	(0.73)
2014	37	66,105	0.06
2013	462	63,840	0.72
2012	781	62,716	1.25

Please note that for the plan year ending September 30, 2016, the gain/(loss) due to liabilities includes a refund of University employer contributions totaling $2,478,596.

HISTORICAL FUNDING LEVELS FOR ACTUARIAL ACCRUED LIABILITIES

(Amounts Shown in Millions)

Valuation Date September 30	Actuarial Accrued Liability	Actuarial Value of Assets	Funded Ratio	Unfunded/(Overfunded) Accrued Liability	Active [4] Member Reported Payroll	Unfunded/(Overfunded) As % of Active Payroll
2005	$ 48,206	$ 38,211	79.3 %	$ 9,995	$ 10,206	97.9%
2006	49,136	39,893	81.2	9,243	9,806	94.3
2006 [1]	49,136	42,995	87.5	6,141	9,806	62.6
2007	51,107	45,335	88.7	5,771	9,851	58.6
2008	53,555	45,677	85.3	7,878	9,958	79.1
2008 [3]	54,608	45,677	83.6	8,931	9,958	89.7
2009	56,685	44,703	78.9	11,982	9,884	121.2
2010	58,543	43,294	74.0	15,250	8,845	172.4
2010 [2]	59,877	43,294	72.3	16,583	8,845	187.5
2010 [3]	60,927	43,294	71.1	17,633	8,845	199.4
2011	63,427	41,038	64.7	22,389	9,156	244.5
2012	64,281	38,450	59.8	25,831	8,649	298.7
2012 [2]	63,277	38,450	60.8	24,827	8,649	287.1
2012 [3]	62,716	38,450	61.3	24,266	8,649	280.6
2013 [2]	63,840	38,044	59.6	25,796	8,273	311.8
2014	65,050	39,626	60.9	25,424	8,167	311.3
2014 [2]	66,105	39,626	59.9	26,479	8,167	324.2
2015	67,728	41,006	60.5	26,721	8,264	323.3
2016	68,858	43,204	62.7	25,654	8,206	312.6
2016 [2]	72,310	43,204	59.7	29,107	8,206	354.7

[1] *Revised asset valuation method.*
[2] *Revised actuarial assumptions and/or methods.*
[3] *Change in plan provisions.*
[4] *Payroll for UAL purposes (Total MPSERS Payroll).*

RECOMMENDED AND ACTUAL EMPLOYER CONTRIBUTIONS
HISTORICAL COMPARISON

(Amounts Shown in Millions)

Fiscal Year Ending September 30	Valuation Date September 30	Contribution Rates As Percents of Valuation Payroll			Actual Payroll	Employer Contribution for Fiscal Year	
						Computed	Actual
	2008	10.15%			$ 10,412.0	$ 1,056.8	
2009	2008 [2]	9.60			10,412.0	999.6	$ 1,000.4
2010	2009	11.56			9,913.6	1,146.0	1,001.3
	2010	14.47			9,513.1	1,376.5	-
	2010 [1]	14.99			9,513.1	1,426.0	-
	2010 [2]	17.59			9,513.1	1,673.4	-
2011	2010 [2,3]	14.93			9,513.1	1,420.3	1,156.1
	2011	20.90			9,064.2	1,894.4	-
2012	2011 [3]	18.24			9,064.2	1,653.3	1,454.4
2013	2011 [4]	19.60			8,793.2	1,723.5	1,364.1
	2012	26.00			8,895.1	2,312.7	-
	2012 [1]	25.49			8,895.1	2,267.4	-
		Non-Hybrid Normal Cost	Hybrid Normal Cost	Amortization Payment			
2014 [5]	2012 [2,4]	4.31 %	3.23 %	18.76 %	8,895.1	2,004.8	1,600.4
2015 [5]	2012 [2,4]	4.31	3.23	18.76	8,426.8	1,917.9	1,967.6
2016 [5]	2013 [1]	4.39	3.17	21.18	8,510.2	2,156.3	2,308.7
	2014	4.41	3.13	21.32			
2017 [5,6]	2014 [1]	3.76	3.13	22.30			
2018 [5,6]	2015	3.75	3.07	22.18			
	2016	3.75	3.05	21.91			
2019 [5,6]	2016 [1]	4.86	3.05	24.01			

[1] *Revised actuarial assumptions and/or methods.* [2] *Change in plan provisions.*

[3] *Does not include UAAL amortization payment for ERI.*

[4] *Incorporates re-amortization of ERI over a 10-year period, rather than a 5-year period.*

[5] *Effective with fiscal year 2014, the normal cost rate and the amortization payment rate are applied to different payrolls and cannot be added.*

[6] *For the fiscal years ending September 30, 2017 and beyond, the actual payroll and actual contribution are not yet known.*

HISTORICAL FUNDING LEVELS FOR PRIORITIZED ACTUARIAL ACCRUED LIABILITY

Valuation Date September 30	Actuarial Accrued Liability ($ in Millions) (1) Active Member Contributions	(2) Retirants and Beneficiaries	(3) Active and Inactive Members (Employer Financed Portion)	Valuation Assets ($ in Millions)	Portion of Actuarial Accrued Liability Covered by Assets (1)	(2)	(3)	(4) [4]
2005	$ 3,898	$ 28,047	$ 16,261	$ 38,211	100.0%	100.0%	38.5%	79.3%
2006	4,082	29,505	15,549	39,893	100.0	100.0	40.6	81.2
2006 [1]	4,082	29,505	15,549	42,995	100.0	100.0	60.5	87.5
2007	4,376	31,254	15,477	45,335	100.0	100.0	62.7	88.7
2008	5,168	32,723	15,664	45,677	100.0	100.0	49.7	85.3
2008 [3]	5,168	32,723	16,717	45,677	100.0	100.0	46.6	83.6
2009	5,449	34,159	17,077	44,703	100.0	100.0	29.8	78.9
2010	5,055	38,315	15,173	43,294	100.0	99.8	0.0	74.0
2010 [2]	5,055	38,589	16,233	43,294	100.0	99.1	0.0	72.3
2010 [3]	5,055	39,639	16,233	43,294	100.0	96.5	0.0	71.1
2011	5,217	41,043	17,167	41,038	100.0	87.3	0.0	64.7
2012	5,296	42,076	16,909	38,450	100.0	78.8	0.0	59.8
2012 [2]	5,296	42,076	15,905	38,450	100.0	78.8	0.0	60.8
2012 [3]	5,296	42,076	15,344	38,450	100.0	78.8	0.0	61.3
2013 [2]	4,909	43,198	15,733	38,044	100.0	76.7	0.0	59.6
2014	5,225	44,126	15,699	39,626	100.0	78.0	0.0	60.9
2014 [2]	5,225	45,545	15,335	39,626	100.0	75.5	0.0	59.9
2015	5,738	46,538	15,452	41,006	100.0	75.8	0.0	60.5
2016	6,189	47,431	15,238	43,204	100.0	78.0	0.0	62.7
2016 [2]	6,189	49,299	16,822	43,204	100.0	75.1	0.0	59.7

[1] *Revised asset valuation method.*
[2] *Revised actuarial assumptions and/or methods.*
[3] *Change in plan provisions.*
[4] *Percent funded on a total valuation asset and total actuarial accrued liability basis.*

FINANCIAL OBJECTIVE ACHIEVEMENT INDICATORS – HISTORICAL COMPARISON (DOLLAR AMOUNTS IN MILLIONS)

		Termination Indicator [4]		Experience Indicator
Valuation September 30	Valuation Assets	Actuarial Present Value of Vested Benefits	Funded Ratio	Actuarial Gain/(Loss)
2004 [2]	$ 38,784	$ 39,737	97.6 %	$ (2,001)
2005	38,211	41,595	91.9	(1,868)
2006	39,893	45,549	87.6	539
2006 [1]	42,995	45,549	94.4	3,641
2007	45,335	47,502	95.4	614
2008	45,677	50,286	90.8	(1,834)
2009	44,703	51,936	86.1	(2,719)
2010	43,294	52,901	81.8	(2,727)
2010 [2]	43,294	53,454	81.0	(2,727)
2010 [3]	43,294	54,505	79.4	(2,727)
2011	41,038	56,446	72.7	(3,981)
2012	38,450	57,372	67.0	(2,673)
2012 [2]	38,450	57,372	67.0	(2,673)
2012 [3]	38,450	57,369	67.0	(2,673)
2013 [2]	38,044	58,395	65.1	(399)
2014	39,626	59,505	66.6	1,084
2014 [2]	39,626	61,254	64.7	1,084
2015	41,006	62,735	65.4	111
2016	43,204	63,865	67.6	1,108
2016 [2]	43,204	66,777	64.7	1,108

1 *Revised asset valuation method.*
2 *Revised actuarial assumptions and/or methods.*
3 *Change in plan provisions.*
4 *Based upon the actuarial assumptions used for funding purposes, including the assumed rate of investment return.*

SECTION C

FUND ASSETS

STATEMENT OF PLAN NET ASSETS (ASSETS AT MARKET OR FAIR VALUE)

	September 30	
	2015	2016
Equity in Common Cash	$ 111,196,402	$ 130,001,542
Total Receivables	255,770,337	244,204,146
Short Term Investment Pools	1,678,300,501	1,406,212,422
Fixed Income Pools	5,145,832,400	5,691,195,762
Domestic Equity Pools	11,785,254,521	11,292,978,453
Real Estate Pool	4,265,411,162	4,605,048,194
Alternative Investment Pools	7,113,517,773	6,635,193,213
International Equity Pools	5,823,675,186	6,877,766,284
Absolute Return Pools	6,208,386,971	6,577,887,293
Securities Lending Collateral less Obligations	373,088	4,173,382
Total Assets	42,387,718,341	43,464,660,691
Other Liabilities	(5,357,469)	(4,081,943)
Net Assets Held in Trust for Pension Benefits	$42,382,360,872	$43,460,578,748

Note: Asset amounts exclude assets held for health benefits.

RECONCILIATION OF PLAN ASSETS

	September 30, 2015			September 30, 2016		
	Non-Pension Plus	**Pension Plus**	**Total**	**Non-Pension Plus**	**Pension Plus**	**Total**
Market Value, Beginning of Year	$43,638,174,660	$ 135,014,304	$43,773,188,964	$42,204,073,869	$ 178,287,003	$42,382,360,872
Additions						
Member Contributions	365,145,605	30,576,687	395,722,292	360,789,568	38,103,570	398,893,138
Employer Contributions[2]	1,957,258,280	10,352,416	1,967,610,696	2,279,403,758	29,253,272	2,308,657,030
Net Investment Income[1]	934,735,967	3,407,073	938,143,040	3,079,374,500	15,803,000	3,095,177,500
Audit Adjustment	0	0	0	0	0	0
Total Additions	3,257,139,852	44,336,176	3,301,476,028	5,719,567,826	83,159,842	5,802,727,668
Deductions						
Benefit Payments	4,530,914,738	0	4,530,914,738	4,671,295,533	4,165	4,671,299,698
Contribution Refunds/Transfers	23,459,269	974,546	24,433,815	23,209,491	1,308,882	24,518,373
Administrative Expenses[1]	24,398,394	88,931	24,487,325	26,079,289	133,836	26,213,125
University Employer Contribution Refund	112,468,242	0	112,468,242	2,478,596	0	2,478,596
Total Deductions	4,691,240,643	1,063,477	4,692,304,120	4,723,062,909	1,446,883	4,724,509,792
Market Value, End of Year	$42,204,073,869	$ 178,287,003	$42,382,360,872	$43,200,578,786	$ 259,999,962	$43,460,578,748

1 *Net investment income and administrative expenses are allocated between Pension Plus and Non-Pension Plus assets, since this information was not provided.*
2 *These values differ from the 2016 CAFR by $3,529,631 due to an asset reallocation reported to the actuary that remedied a fiscal year 2014 normal cost discrepancy for the Pension Plus Plan.*

DEVELOPMENT OF VALUATION ASSETS – NON-HYBRID

	2016	2017	2018	2019	2020
1. Beginning of Year Assets					
a. Market Value	$ 42,204,073,869				
b. Valuation Assets	40,829,364,640				
2. End of Year Assets at Market Value	43,200,578,786				
3. Net Additions to Market Value					
a. Member Contributions	360,789,568				
b. Employer Contributions	2,279,403,758				
c. Investment Income	3,079,374,500				
d. Benefit Payments	(4,671,295,533)				
e. Contribution Refunds/Transfers	(23,209,491)				
f. Administrative Expenses	(26,079,289)				
g. Transfer (to) from stabilization subaccount	0				
h. University Employer Contribution Refund [1]	(2,478,596)				
i. Audit Adjustment	0				
j. Total Additions to Market Value	996,504,917				
4. Summary of Net Additions to Market Value					
a. Net Contributions and Transfers = 3a + 3b + 3e +3g	2,616,983,835				
b. Net Investment Income = 3c + 3f	3,053,295,211				
c. Benefit Payments = 3d	(4,671,295,533)				
d. University Employer Contribution Refund = 3h [1]	(2,478,596)				
e. Audit Adjustment = 3i	0				
f. Total Additions to Market Value	996,504,917				
5. Average Valuation Assets = 1b + .5 x (4a + 4c) + 4e	39,800,969,493				
6. Imputed Income at Valuation Rate = 8.00% x 5	3,184,077,559				
7. Gain (Loss) from Investments = 4b - 6	(130,782,348)				
8. Portion of Gains (Losses) Recognized from Prior Years					
a. From this year = .2 * 7	(26,156,470)				
b. From one year ago	(432,077,546)	$ (26,156,470)			
c. From two years ago	642,831,577	(432,077,546)	$ (26,156,470)		
d. From three years ago	371,421,574	642,831,577	(432,077,546)	$ (26,156,470)	
e. From four years ago	431,681,532	371,421,576	642,831,576	(432,077,545)	$ (26,156,468)
f. Total	987,700,667	556,019,137	184,597,560	(458,234,015)	(26,156,468)
9. Change in Valuation Assets = 4a + 4c + 4d + 4e + 6 + 8f	2,114,987,932				
10. End of Year Assets					
a. Market Value = 2	43,200,578,786				
b. Valuation Assets					
b1. Preliminary Valuation Assets = 1b + 9	42,944,352,572				
b2. Corridor Percent	30%				
b3. Upper Corridor Limit: (100% + 10b2) x 10a	56,160,752,422				
b4. Lower Corridor Limit: (100% - 10b2) x 10a	30,240,405,150				
b5. Final Valuation Assets	42,944,352,572				
11. Actuarial Rate of Return	10.48%				
12. Market Rate of Return	7.42%				

[1] *The University Employer Contribution Refund was assumed to occur at the end of the year for fiscal year 2015 and in the middle of the year for fiscal year 2016.*

DEVELOPMENT OF VALUATION ASSETS – NON-HYBRID (CONCLUDED)

	2011	2012	2013	2014	2015
1. Beginning of Year Assets					
a. Market Value	$ 35,855,301,533	$ 34,664,520,519	$ 37,670,648,117	$ 39,944,214,960	$ 43,638,174,660
b. Valuation Assets	43,293,601,522	41,027,934,880	38,421,416,945	37,975,547,627	39,500,051,337
2. End of Year Assets at Market Value	34,664,520,519	37,670,648,117	39,944,214,960	43,638,174,660	42,204,073,869
3. Net Additions to Market Value					
a. Member Contributions	325,857,955	324,327,745	367,423,484	381,152,795	365,145,605
b. Employer Contributions	1,152,612,768	1,448,682,399	1,345,883,238	1,575,385,927	1,957,258,280
c. Investment Income	1,332,252,870	5,384,106,432	4,853,588,768	6,177,460,628	934,735,967
d. Benefit Payments	(3,942,027,101)	(4,082,242,506)	(4,238,482,066)	(4,388,328,518)	(4,530,914,738)
e. Contribution Refunds/Transfers	(36,554,464)	(31,647,304)	(29,876,949)	(28,058,275)	(23,459,269)
f. Administrative Expenses	(22,923,042)	(37,099,168)	(24,969,632)	(23,652,857)	(24,398,394)
g. Transfer (to) from stabilization subaccount	0	0	0	0	0
h. University Employer Contribution Refund [1]	0	0	0	0	(112,468,242)
i. Audit Adjustment	0	0	0	0	0
j. Total Additions to Market Value	(1,190,781,014)	3,006,127,598	2,273,566,843	3,693,959,700	(1,434,100,791)
4. Summary of Net Additions to Market Value					
a. Net Contributions and Transfers = 3a + 3b + 3e +3g	1,441,916,259	1,741,362,840	1,683,429,773	1,928,480,447	2,298,944,616
b. Net Investment Income = 3c + 3f	1,309,329,828	5,347,007,264	4,828,619,136	6,153,807,771	910,337,573
c. Benefit Payments = 3d	(3,942,027,101)	(4,082,242,506)	(4,238,482,066)	(4,388,328,518)	(4,530,914,738)
d. University Employer Contribution Refund = 3h [1]	0	0	0	0	(112,468,242)
e. Audit Adjustment = 3i	0	0	0	0	0
f. Total Additions to Market Value	(1,190,781,014)	3,006,127,598	2,273,566,843	3,693,959,700	(1,434,100,791)
5. Average Valuation Assets =					
1b + .5 x (4a + 4c) + 4e	42,043,546,101	39,857,495,047	37,143,890,798	36,745,623,591	38,384,066,276
6. Imputed Income at Valuation Rate = 8.00% x 5	3,363,483,688	3,188,599,604	2,971,511,264	2,939,649,887	3,070,725,302
7. Gain (Loss) from Investments = 4b - 6	(2,054,153,860)	2,158,407,660	1,857,107,872	3,214,157,884	(2,160,387,729)
8. Portion of Gains (Losses) Recognized from Prior Years					
a. From this year = .2 * 7	(410,830,772)	431,681,532	371,421,574	642,831,577	(432,077,546)
b. From one year ago	9,597,984	(410,830,772)	431,681,532	371,421,574	642,831,577
c. From two years ago	(1,264,198,605)	9,597,984	(410,830,772)	431,681,532	371,421,574
d. From three years ago	(2,220,488,012)	(1,264,198,605)	9,597,984	(410,830,772)	431,681,532
e. From four years ago	756,879,917	(2,220,488,012)	(1,264,198,607)	9,597,983	(410,830,772)
f. Total	(3,129,039,488)	(3,454,237,873)	(862,328,289)	1,044,701,894	603,026,365
9. Change in Valuation Assets = 4a + 4c + 4d + 4e + 6 + 8f	(2,265,666,642)	(2,606,517,935)	(445,869,318)	1,524,503,710	1,329,313,303
10. End of Year Assets					
a. Market Value = 2	34,664,520,519	37,670,648,117	39,944,214,960	43,638,174,660	42,204,073,869
b. Valuation Assets					
b1. Preliminary Valuation Assets = 1b + 9	41,027,934,880	38,421,416,945	37,975,547,627	39,500,051,337	40,829,364,640
b2. Corridor Percent				30%	30%
b3. Upper Corridor Limit: (100% + 10b2) x 10a				56,729,627,058	54,865,296,030
b4. Lower Corridor Limit: (100% - 10b2) x 10a				30,546,722,262	29,542,851,708
b5. Final Valuation Assets	41,027,934,880	38,421,416,945	37,975,547,627	39,500,051,337	40,829,364,640
11. Actuarial Rate of Return	0.56%	(0.67)%	5.68%	10.84%	9.57%
12. Market Rate of Return	3.78%	15.96%	13.27%	15.90%	2.14%

[1] *The University Employer Contribution Refund was assumed to occur at the end of the year for fiscal year 2015 and in the middle of the year for fiscal year 2016.*

DEVELOPMENT OF VALUATION ASSETS – HYBRID

	2016	2017	2018	2019	2020
1. Beginning of Year Assets					
a. Market Value	$ 178,287,003				
b. Valuation Assets	176,988,329				
2. End of Year Assets at Market Value	259,999,962				
3. Net Additions to Market Value					
a. Member Contributions	38,103,570				
b. Employer Contributions	29,253,272				
c. Investment Income	15,803,000				
d. Benefit Payments	(4,165)				
e. Contribution Refunds/Transfers	(1,308,882)				
f. Administrative Expenses	(133,836)				
g. Transfer (to) from stabilization subaccount	0				
h. University Employer Contribution Refund [1]	0				
i. Audit Adjustment	0				
j. Total Additions to Market Value	81,712,959				
4. Summary of Net Additions to Market Value					
a. Net Contributions and Transfers = 3a + 3b + 3e +3g	66,047,960				
b. Net Investment Income = 3c + 3f	15,669,164				
c. Benefit Payments = 3d	(4,165)				
d. University Employer Contribution Refund = 3h [1]	0				
e. Audit Adjustment = 3i	0				
f. Total Additions to Market Value	81,712,959				
5. Average Valuation Assets = 1b + .5 x (4a + 4c) + 4e	210,010,227				
6. Imputed Income at Valuation Rate = 7.00% x 5	14,700,716				
7. Gain (Loss) from Investments = 4b - 6	968,448				
8. Portion of Gains (Losses) Recognized from Prior Years					
a. From this year = .2 * 7	193,690				
b. From one year ago	(1,373,952)	$ 193,690			
c. From two years ago	1,747,501	(1,373,952)	$ 193,690		
d. From three years ago	611,291	1,747,501	(1,373,952)	$ 193,690	
e. From four years ago	329,398	611,290	1,747,499	(1,373,950)	$ 193,688
f. Total	1,507,928	1,178,529	567,237	(1,180,260)	193,688
9. Change in Valuation Assets = 4a + 4c + 4d + 4e + 6 + 8f	82,252,439				
10. End of Year Assets					
a. Market Value = 2	259,999,962				
b. Valuation Assets					
b1. Preliminary Valuation Assets = 1b + 9	259,240,768				
b2. Corridor Percent	30%				
b3. Upper Corridor Limit: (100% + 10b2) x 10a	337,999,951				
b4. Lower Corridor Limit: (100% - 10b2) x 10a	181,999,973				
b5. Final Valuation Assets	259,240,768				
11. Actuarial Rate of Return	7.72%				
12. Market Rate of Return	7.42%				

[1] *The University Employer Contribution Refund was assumed to occur at the end of the year for fiscal year 2015 and in the middle of the year for fiscal year 2016.*

DEVELOPMENT OF VALUATION ASSETS – HYBRID (CONCLUDED)

	2011	2012	2013	2014	2015
1. Beginning of Year Assets					
a. Market Value	$ 176,312	$ 10,132,876	$ 29,763,844	$ 71,324,656	$ 135,014,304
b. Valuation Assets	174,579	10,261,650	28,542,947	67,955,907	125,564,156
2. End of Year Assets at Market Value	10,132,876	29,763,844	71,324,656	135,014,304	178,287,003
3. Net Additions to Market Value					
a. Member Contributions	6,351,179	11,143,134	17,584,103	24,290,977	30,576,687
b. Employer Contributions	3,448,135	5,756,508	18,253,224	24,989,205	10,352,416
c. Investment Income	194,760	2,969,623	6,321,496	15,250,232	3,407,073
d. Benefit Payments	0	0	0	0	0
e. Contribution Refunds/Transfers	(34,159)	(217,835)	(565,490)	(782,374)	(974,546)
f. Administrative Expenses	(3,351)	(20,462)	(32,521)	(58,392)	(88,931)
g. Transfer (to) from stabilization subaccount	0	0	0	0	0
h. University Employer Contribution Refund [1]	0	0	0	0	0
i. Audit Adjustment	0	0	0	0	0
j. Total Additions to Market Value	9,956,564	19,630,968	41,560,812	63,689,648	43,272,699
4. Summary of Net Additions to Market Value					
a. Net Contributions and Transfers = 3a + 3b + 3e +3g	9,765,155	16,681,807	35,271,837	48,497,808	39,954,557
b. Net Investment Income = 3c + 3f	191,409	2,949,161	6,288,975	15,191,840	3,318,142
c. Benefit Payments = 3d	0	0	0	0	0
d. University Employer Contribution Refund = 3h [1]	0	0	0	0	0
e. Audit Adjustment = 3i	0	0	0	0	0
f. Total Additions to Market Value	9,956,564	19,630,968	41,560,812	63,689,648	43,272,699
5. Average Valuation Assets =					
1b + .5 x (4a + 4c) + 4e	5,057,157	18,602,554	46,178,866	92,204,811	145,541,435
6. Imputed Income at Valuation Rate = 7.00% x 5	354,001	1,302,179	3,232,521	6,454,337	10,187,900
7. Gain (Loss) from Investments = 4b - 6	(162,592)	1,646,982	3,056,454	8,737,503	(6,869,758)
8. Portion of Gains (Losses) Recognized from Prior Years					
a. From this year = .2 * 7	(32,518)	329,396	611,291	1,747,501	(1,373,952)
b. From one year ago	433	(32,518)	329,396	611,291	1,747,501
c. From two years ago	0	433	(32,518)	329,396	611,291
d. From three years ago	0	0	433	(32,518)	329,396
e. From four years ago	0	0	0	434	(32,520)
f. Total	(32,085)	297,311	908,602	2,656,104	1,281,716
9. Change in Valuation Assets = 4a + 4c + 4d + 4e + 6 + 8f	10,087,071	18,281,297	39,412,960	57,608,249	51,424,173
10. End of Year Assets					
a. Market Value = 2	10,132,876	29,763,844	71,324,656	135,014,304	178,287,003
b. Valuation Assets					
b1. Preliminary Valuation Assets = 1b + 9	10,261,650	28,542,947	67,955,907	125,564,156	176,988,329
b2. Corridor Percent				30%	30%
b3. Upper Corridor Limit: (100% + 10b2) x 10a				175,518,595	231,773,104
b4. Lower Corridor Limit: (100% - 10b2) x 10a				94,510,013	124,800,902
b5. Final Valuation Assets	10,261,650	28,542,947	67,955,907	125,564,156	176,988,329
11. Actuarial Rate of Return	6.37%	8.60%	8.97%	9.88%	7.88%
12. Market Rate of Return	3.78%	15.96%	13.27%	15.90%	2.14%

[1] *The University Employer Contribution Refund was assumed to occur at the end of the year for fiscal year 2015 and in the middle of the year for fiscal year 2016.*

HISTORY OF APPROXIMATE INVESTMENT RETURN RATES

Plan Year Ending September 30	Approximate Rate of Return[1] Market	Non-Hybrid Actuarial	Hybrid (PPP) Actuarial
2007	16.99 %	9.80 %	
2008	(15.89)	4.71	
2009	(7.16)	1.91	
2010	10.59	1.77	8.52 %
2011	3.78	0.56	6.37
2012	15.96	(0.67)	8.60
2013	13.27	5.68	8.97
2014	15.90	10.84	9.88
2015	2.14	9.57	7.88
2016	7.42	10.48	7.72
Average Returns:			
Last five years:	10.80 %	7.09 %	8.61 %
Last ten years:	5.76 %	5.38 %	8.27 %

[1] *Approximate return based on ratio of total investment return to average asset value, using an assumed beginning-of-year timing of audit adjustments (if any) and an assumed mid-year timing of other asset flows, unless otherwise noted.*

HISTORICAL GROWTH OF ASSETS AT MARKET VALUE

Fiscal Year Ended September 30	Revenues by Source: Member Contributions	Revenues by Source: Employer Contributions	Revenues by Source: Net Investment Income [1]	Expenses by Type: Retirement Benefits	Expenses by Type: Return of Contributions and Transfers	Expenses by Type: Administrative Expenses	Market Value of Assets
1997	$ 253,358,290	$ 904,817,513	$ 5,738,458,322 [2]	$ 1,317,828,100	$ 17,859,063	$ 12,102,095	$ 30,001,858,799
1998	252,672,436	622,437,022	2,409,304,679	1,454,451,439	21,626,704	14,463,339	31,795,731,454
1999	518,861,556	574,436,929	5,075,649,100	1,587,992,361	11,198,300	16,525,359	36,348,963,019
2000	321,557,146	655,258,922	4,755,872,070	1,735,936,328	17,455,802	15,918,143	40,312,340,884
2001	371,548,016	629,924,827	(4,575,630,855)	1,890,812,400	19,835,729	17,312,250	34,810,222,493
2002	413,163,871	603,949,327	(3,733,441,844)	2,041,439,863	20,813,845	23,610,482	30,008,029,657
2003	379,084,549	697,906,265	4,532,071,835	2,180,574,193	13,642,300	23,016,963	33,399,858,850
2004	456,352,606	697,647,338	4,130,642,038	2,358,216,073	18,403,233	19,374,673	36,288,506,853
2005	368,240,837	774,277,778	4,530,606,037	2,558,017,710	22,166,261	19,997,954	39,361,449,580
2006	518,599,720	995,932,425	4,927,177,496	2,761,292,217	24,024,234	22,501,098	42,995,341,672
2007	356,761,212	835,366,382	7,177,114,740	2,944,920,179	32,241,730	24,489,202	48,362,932,895
2008	399,256,616	999,374,879	(7,398,629,969)	3,117,434,847	32,720,146	24,740,628	39,188,038,800
2009	357,249,466	1,000,375,355	(2,712,429,401)	3,278,118,116	33,943,530	22,793,011	34,498,379,563
2010	377,748,755	1,001,251,673	3,563,025,960	3,525,020,341	33,907,066	26,000,699	35,855,477,845
2011	332,209,134	1,156,060,903	1,332,447,630	3,942,027,101	36,588,623	22,926,393	34,674,653,395
2012	335,470,879	1,454,438,907	5,387,076,055	4,082,242,506	31,865,139	37,119,630	37,700,411,961
2013	385,007,587	1,364,136,462	4,859,910,264	4,238,482,066	30,442,439	25,002,153	40,015,539,616
2014	405,443,772	1,600,375,132	6,192,710,860	4,388,328,518	28,840,649	23,711,249	43,773,188,964
2015	395,722,292	1,967,610,696	938,143,040	4,530,914,738	136,902,057 [3]	24,487,325	42,382,360,872
2016	398,893,138	2,308,657,030	3,095,177,500	4,671,299,698	26,996,969 [3]	26,213,125	43,460,578,748

[1] *Includes miscellaneous income.*
[2] *Includes other changes in net assets/reserves/fund balances.*
[3] *Includes University employer contribution refund.*

Note: Data for the year 2007 and prior years was provided by the State of Michigan Department of Technology, Management and Budget - Financial Services.

SECTION D

CENSUS DATA

SUMMARY OF PARTICIPANT DATA BY CATEGORY

	As of September 30	
	2015	**2016**
Retirees and beneficiaries currently receiving benefits:		
Regular benefits	184,496	187,546
Survivor benefits	16,960	17,274
Disability benefits	6,195	6,187
Total	207,651	211,007
Current Employees:		
Vested	105,474	102,846
Non-Vested	89,483	86,915
Total	194,957	189,761
Inactive employees entitled to benefits and not yet receiving them:	22,717	22,508
Total Participants	425,325	423,276

The September 30, 2015 inactive counts include 5,272 people who elected not to continue future accruals (after the transition date of February 1, 2013) in the defined benefit plan as a result of PA 300. All counts exclude 7,914 people hired after PA 300 who elected to participate in the pure defined contribution plan and 2,831 active records with both $0 salary and 0 service provided in the September 30, 2015 valuation data.

The September 30, 2016 inactive counts include 4,640 people who elected not to continue future accruals (after the transition date of February 1, 2013) in the defined benefit plan as a result of PA 300. All counts exclude 9,878 people hired after PA 300 who elected to participate in the pure defined contribution plan and 3,366 active records with both $0 salary and 0 service provided in the September 30, 2016 valuation data.

UAAL contributions are expected to continue to be collected on the payroll of these members in the future.

RETIREES AND BENEFICIARIES – HISTORICAL COMPARISON

Year Ended September 30	Rolls End of Year Number	Rolls End of Year Annual Benefit[1]	Annual % Increase Number	Annual % Increase Benefits	Average Annual Benefit
1997	111,842	$ 1,371,479	4.1%	9.6%	$ 12,263
1998	116,620	1,505,362	4.3	9.8	12,908
1999	120,913	1,639,825	3.7	8.9	13,562
2000	126,115	1,798,028	4.3	9.6	14,257
2001	130,790	1,943,444	3.7	8.1	14,859
2002	135,277	2,094,382	3.4	7.8	15,482
2003	139,814	2,251,766	3.4	7.5	16,105
2004	145,378	2,431,636	4.0	8.0	16,726
2005	151,706	2,644,700	4.4	8.8	17,433
2006	157,163	2,828,460	3.6	6.9	17,997
2007	162,844	3,013,075	3.6	6.5	18,503
2008	167,265	3,171,261	2.7	5.3	18,960
2009	171,922	3,336,165	2.8	5.2	19,405
2010	187,722	3,814,755	9.2	14.3	20,321
2011	192,435	3,987,227	2.5	4.5	20,720
2012	196,661	4,134,218	2.2	3.7	21,022
2013	200,952	4,289,281	2.2	3.8	21,345
2014	204,512	4,431,065	1.8	3.3	21,667
2015	207,651	4,568,852	1.5	3.1	22,003
2016	211,007	4,709,668	1.6	3.1	22,320

[1] *In thousands of dollars.*

RETIREES AND BENEFICIARIES AS OF SEPTEMBER 30, 2016 BY TYPE OF RETIREMENT AND SELECTED OPTION

Amount of Monthly Benefit	Number of Retirees	Type of Retirement*						Selected Option**				
		1	2	3	4	5	6	Opt. 1	Opt. 2	Opt. 3	Opt. 4	Opt 1E 2E,3E,4E
$ 1 - 200	12,086	10,611	1,026	68	256	3	122	6,474	2,926	1,689	207	790
201 - 400	22,753	19,690	1,431	115	1,208	2	307	12,368	4,857	3,791	564	1,173
401 - 600	17,776	14,951	1,140	89	1,228	1	367	9,252	3,758	3,297	529	940
601 - 800	13,551	11,302	865	70	981	1	332	6,888	2,710	2,580	529	844
801 - 1,000	11,299	9,358	786	48	774	1	332	5,381	2,338	2,275	501	804
1,001 - 1,200	9,885	8,267	772	22	558	0	266	4,484	2,096	2,018	470	817
1,201 - 1,400	8,819	7,230	863	12	477	0	237	3,820	1,852	1,740	487	920
1,401 - 1,600	8,231	6,854	791	13	344	0	229	3,359	1,701	1,636	460	1,075
1,601 - 1,800	7,940	6,730	714	6	298	0	192	3,050	1,651	1,532	473	1,234
1,801 - 2,000	7,863	6,867	548	6	259	1	182	2,944	1,622	1,467	513	1,317
Over 2,000	90,804	85,686	3,571	9	708	3	827	39,732	17,440	18,361	7,252	8,019
Totals	211,007	187,546	12,507	458	7,091	12	3,393	97,752	42,951	40,386	11,985	17,933

*** Type of Retirement**

1 – Normal retirement for age & service
2 – Survivor payment – normal retirement
3 – Duty disability retirement (including survivors)
4 – Non-duty disability retirement (including survivors)
5 – Survivor payment – duty death in service
6 – Survivor payment – non-duty death in service

**** Selected Option**

Opt. 1 – Straight life allowance
Opt. 2 – 100% survivor option
Opt. 3 – 50% survivor option
Opt. 4 – 75% survivor option
Opt. 1E, 2E, 3E, 4E – equated retirement plans

ACTIVE MEMBERS BY CLASSIFICATION (DEFINED BENEFIT ONLY)

	September 30, 2015	September 30, 2016
Basic Members		
Number	17,512	15,557
Average Age	55.6 years	56.0 years
Average Service	25.1 years	25.4 years
Reported Payroll	$ 961,697,984	$ 863,327,485
Average Annual Pay	$ 54,917	$ 55,494
MIP Members		
Number	139,406	132,100
Average Age	47.5 years	48.0 years
Average Service	14.3 years	15.0 years
Reported Payroll	$ 6,301,381,830	$ 6,163,678,791
Average Annual Pay	$ 45,202	$ 46,659
PPP Members		
Number	38,039	42,104
Average Age	36.6 years	36.9 years
Average Service	1.7 years	2.0 years
Reported Payroll	$ 741,929,210	$ 885,558,459
Average Annual Pay	$ 19,504	$ 21,033
Total		
Number	194,957	189,761
Average Age	46.1 years	46.2 years
Average Service	12.8 years	13.0 years
Reported Payroll	$ 8,005,009,024	$ 7,912,564,735
Average Annual Pay	$ 41,060	$ 41,698

The above active statistics exclude active members hired after PA 300 who elected the pure defined contribution plan (7,914 as of September 1, 2015 and 9,878 as of September 1, 2016). The above active statistics exclude active members who elected not to continue future accruals (after the transition date of February 1, 2013) in the defined benefit plan as a result of PA 300 (5,272 as of September 1, 2015 and 4,640 as of September 1, 2016). The above active statistics exclude people provided in the valuation with both $0 salary and 0 service (2,831 as of September 1, 2015 and 3,366 as of September 1, 2016). Annual reported payroll for those employees excluded from the active statistics (above) are $293.5 million as of September 30, 2016 ($258.9 million as of September 30, 2015).

UAAL contributions are expected to continue to be collected on the payroll of all of these excluded members in the future.

ACTIVE MEMBERS (DEFINED BENEFIT ONLY)

Members in Active Service as of September 30, 2016
by Age and Years of Service

Age	Years of Service							Total	Total	Average
	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25 - 29	30 & up	Count	Pay	Pay
Under 20	187							187	$ 2,130,518	$ 11,393
20 - 24	4,745	7						4,752	60,333,402	12,696
25 - 29	10,430	1,114	9					11,553	311,811,209	26,990
30 - 34	8,275	6,234	1,017	613				16,139	568,394,392	35,219
35 - 39	7,467	4,168	4,238	5,431	1,293			22,597	1,001,435,775	44,317
40 - 44	6,848	3,259	2,623	6,239	6,167	502		25,638	1,268,451,034	49,475
45 - 49	6,900	3,746	3,091	4,496	7,307	4,315	310	30,165	1,473,822,173	48,859
50 - 54	5,443	3,618	3,623	4,413	4,433	5,177	2,286	28,993	1,281,042,148	44,185
55 - 59	3,980	2,880	3,427	4,998	4,638	3,527	3,663	27,113	1,107,922,567	40,863
60 - 64	2,717	1,738	1,692	2,584	2,721	2,046	2,515	16,013	632,453,900	39,496
65 - 69	1,316	708	469	469	531	481	735	4,709	161,560,685	34,309
70 & Over	783	352	218	153	90	82	224	1,902	43,206,932	22,717
Total	59,091	27,824	20,407	29,396	27,180	16,130	9,733	189,761	$ 7,912,564,735	$ 41,698

The September 30, 2016 active statistics exclude: (1) 4,640 people who elected not to continue future accruals (after the transition date of February 1, 2013) in the defined benefit plan as a result PA 300, (2) 9,878 people hired after PA 300 who elected the pure defined contribution plan, and (3) 3,366 people provided in the valuation with both $0 salary and 0 service. UAAL contributions are expected to continue to be collected on the payroll of these members in the future.

ACTIVE AND INACTIVE MEMBERS REPORTED FOR VALUATION HISTORICAL COMPARISON

Valuation Date September 30	Number of Inactive Vested Members	Active Members [2]					
				Average			
		Number	Reported Payroll[1]	Annual Pay	% Increase	Age	Years of Service
1997	*	295,691	$ 8,027,450	$ 27,148	2.6 %	43.6	10.0
1998	*	302,016	8,265,463	27,368	0.8	43.5	9.7
1999	*	309,324	8,643,718	27,944	2.1	43.6	9.5
2000	*	312,699	8,984,737	28,733	2.8	43.6	9.7
2001	*	318,538	9,264,183	29,083	1.2	43.6	9.6
2002	14,403	326,350	9,707,281	29,745	2.3	43.6	9.5
2003	14,247	326,938	10,043,862	30,721	3.3	43.8	9.7
2004	15,756	322,494	10,407,072	32,271	5.0	43.8	9.7
2005	16,806	316,151	10,205,972	32,282	0.0	43.7	9.7
2006	15,679	308,233	9,806,452	31,815	(1.4)	44.1	9.9
2007	14,999	295,984	9,851,471	33,284	4.6	44.5	10.3
2008	14,312	278,642	9,958,132	35,738	7.4	44.9	10.8
2009	14,454	268,208	9,883,674	36,851	3.1	45.4	11.4
2010	15,026	242,568	8,845,019	36,464	(1.1)	45.2	11.1
2011	15,090	236,660	9,155,691	38,687	6.1	45.3	11.3
2012	16,167	223,769	8,649,029	38,652	(0.1)	45.7	11.9
2013	16,235	212,525	8,225,140	38,702	0.1	46.0	12.3
2014	23,140	199,674	7,943,922	39,784	2.8	46.1	12.7
2015	22,717	194,957	8,005,009	41,060	3.2	46.1	12.8
2016 [3]	22,508	189,761	7,912,565	41,698	1.6	46.2	13.0

* *Not available.*

1 *Reported payroll in thousands. Beginning with the September 30, 2006 valuation, the payroll is no longer adjusted, and the payroll is the sum of the actual pays reported for each active member.*

2 *Active members hired after PA 300 who elected the pure defined contribution plan are excluded from the statistics above. Beginning with the September 30, 2014 valuation, active members who elected not to continue future accruals in the defined benefit plan as a result of PA 300 are included in the number of inactive vested members.*

3 *The September 30, 2016 inactive vested statistic includes 4,640 people who elected not to continue future accruals (after the transition date of February 1, 2013) in the defined benefit plan as a result PA 300. The September 30, 2016 active statistics exclude these members as well as 9,878 people hired after PA 300 who elected the pure defined contribution plan and 3,366 people provided in the valuation with both $0 salary and 0 service. UAAL contributions are expected to continue to be collected on the payroll of these members in the future.*

SECTION E

METHODS AND ASSUMPTIONS

VALUATION METHODS

Actuarial Cost Method - Normal cost and the allocation of benefit values between service rendered before and after the valuation date was determined using an Individual Entry-Age Actuarial Cost Method having the following characteristics:

(i) the annual normal cost for each individual active member, payable from the date of employment to the date of retirement, is sufficient to accumulate the value of the member's benefit at the time of retirement;

(ii) each annual normal cost is a constant percentage of the member's year by year projected covered pay.

Actuarial gains (losses), as they occur, reduce (increase) the Unfunded Actuarial Accrued Liability.

Financing of Unfunded Actuarial Accrued Liabilities - Unfunded actuarial accrued liabilities (full funding credit if assets exceed liabilities) were amortized by level (principal and interest combined) percent-of-payroll contributions over a reasonable period of future years.

VALUATION METHODS

Present value of future reconciliation payments – Subsection 41(9) of the MPSERS statute provides for a process to reconcile actual employer contributions to the actuarially computed contribution requirements. In order to avoid duplication of the employer contributions, the present value of future reconciliation payments is subtracted from the unfunded actuarial accrued liability (UAAL) to determine the remaining UAAL contribution. Please refer to pages A-1 and E-13.

Amortization of UAAL resulting from the Early Retirement Incentive (ERI) program of 2010 – It has been reported that 1.36% of payroll will be contributed beginning in fiscal year 2013 for a 10-year period to amortize the UAAL associated with the ERI program of 2010. In order to avoid duplication of the employer contributions, the present value of future ERI amortization payments is subtracted from the unfunded actuarial accrued liability (UAAL) to determine the remaining UAAL contribution. Please refer to page A-1.

Actuarial Value of System Assets - The actuarial value of assets recognizes assumed investment income fully each year. Differences between actual and assumed investment income are phased in over a closed five-year period. During periods when investment performance exceeds the assumed rate, actuarial value of assets will tend to be less than market value. During periods when investment performance is less than the assumed rate, actuarial value of assets will tend to be greater than market value. The actuarial value of assets was reset to market value as of September 30, 2006, with five-year smoothing restarted at that time. The actuarial value of assets is developed separately for the Non-Hybrid and Hybrid portions of the System. The total actuarial value of assets is the sum of these two components. The actuarial value of assets is not permitted to deviate from the market value of assets by more than 30%.

VALUATION ASSUMPTIONS

In accordance with Section 41(1) of the MPSERS statute (Act 300 of the Public Acts of 1980, as amended), the actuarial assumptions are adopted by the Retirement Board and the Department of Management and Budget after consultation with the actuary and the State Treasurer. The actuarial assumptions were based upon the results of an Experience Study for MPSERS covering the period October 1, 2007 through September 30, 2012. A report dated May 7, 2014 presented the results of the Experience Study. In addition, the investment return assumption was updated beginning with the September 30, 2016 valuation to reflect reductions in capital market assumptions for the asset classes in which the System invests. The actuarial assumptions represent estimates of future experience.

The rate of investment return was 7.5% a year, compounded annually net of investment and administrative expenses for the Non-Hybrid group and 7.0% a year, compounded annually net of investment and administrative expenses for the Hybrid group (PPP). The 7.5% assumption was first used for the September 30, 2016 valuation of the System.

The assumed real rate of investment return is the rate of investment return in excess of either wage inflation or price inflation. Considering a wage inflation assumption of 3.5% and a price inflation assumption of 2.5%, the 7.5% nominal rate of investment return translates into a real rate of investment return of 4.0% over wage inflation and 5.0% over price inflation for the Non-Hybrid group. Considering a wage inflation assumption of 3.5% and a price inflation assumption of 2.5%, the 7.0% nominal rate of investment return translates into a real rate of investment return of 3.5% over wage inflation and 4.5% over price inflation for the Hybrid group.

VALUATION ASSUMPTIONS

The rates of pay increase used for individual members are in accordance with the table below. This assumption is used to project a member's current pay to the pay upon which System benefits will be based. The current assumption was first used for the September 30, 2014 valuation of the System.

Sample Ages	Pay Increase Assumptions For an Individual Member: Merit & Seniority	Base (Economy)	Increase Next Year
20	8.8 %	3.5 %	12.3 %
25	8.8	3.5	12.3
30	5.4	3.5	8.9
35	3.3	3.5	6.8
40	2.1	3.5	5.6
45	1.3	3.5	4.8
50	0.6	3.5	4.1
55	0.2	3.5	3.7
60	0.0	3.5	3.5
65	0.0	3.5	3.5
Ref	423		

The charts shown in this section may include a reference number (for example, 423 is used above). These reference numbers are used by GRS to track and identify assumption tables.

VALUATION ASSUMPTIONS

The healthy life post-retirement mortality table used in this valuation of the System was the RP-2000 Male and Female Combined Healthy Mortality Tables, adjusted for mortality improvements to 2025 using projection scale BB. This assumption was first used for the September 30, 2014 valuation of the System. Sample rates of mortality and years of life expectancy are shown below. This assumption is used to measure the probabilities of each benefit payment being made after retirement. With regard to a margin for mortality improvement, based upon the results of the last Experience Study, the assumed rates assume 10% fewer deaths for males and 5% fewer deaths for females than those observed during the period 2007-2012.

Sample Attained Ages	Probability of Dying Next Year		Future Life Expectancy (years)	
	Men	Women	Men	Women
50	0.20 %	0.16 %	33.54	36.08
55	0.34	0.24	28.92	31.39
60	0.57	0.39	24.49	26.82
65	0.94	0.72	20.27	22.44
70	1.52	1.24	16.31	18.35
75	2.59	2.08	12.68	14.62
80	4.41	3.39	9.48	11.27
Ref:	1091 x 1.00	1092 x 1.00		

For active members**,** the probabilities of dying before retirement were based upon the RP-2000 Male and Female Combined Healthy Mortality Table, adjusted for mortality improvements to 2025 using projection scale BB. For men, 80% of the male table rates were used. For women, 70% of the female table rates were used. This assumption was first used for the September 30, 2014 valuation of the System. Sample rates of mortality and years of life expectancy are shown on the following page.

VALUATION ASSUMPTIONS

Sample Attained Ages	Probability of Dying Next Year		Future Life Expectancy (years)	
	Men	Women	Men	Women
20	0.03 %	0.01 %	64.67	68.94
25	0.03	0.01	59.75	63.98
30	0.03	0.02	54.84	59.03
35	0.06	0.03	49.95	54.09
40	0.08	0.05	45.11	49.19
45	0.11	0.07	40.30	44.32
50	0.16	0.11	35.54	39.50
55	0.27	0.17	30.87	34.74
60	0.45	0.28	26.36	30.07
65	0.75	0.50	22.04	25.56
Ref:	1091 x 0.80	1092 x 0.70		

Active member deaths are assumed to be non-duty related.

The disabled life mortality table used in this valuation of the System was the RP-2000 Male and Female Combined Healthy Mortality Tables, adjusted for mortality improvements to 2025 using projection scale BB, set forward 10 years. This assumption was first used for the September 30, 2014 valuation of the System. For disabled retirees, the sample rates of mortality and years of life expectancy are shown below.

Sample Attained Ages	Probability of Dying Next Year		Future Life Expectancy (years)	
	Men	Women	Men	Women
50	0.57 %	0.39 %	24.49	26.82
55	0.94	0.72	20.27	22.44
60	1.52	1.24	16.31	18.35
65	2.59	2.08	12.68	14.62
70	4.41	3.39	9.48	11.27
75	7.59	5.73	6.76	8.35
80	13.91	9.99	4.59	5.97
Ref:	1091 x 1.00	1092 x 1.00		

VALUATION ASSUMPTIONS

The rates of retirement used to measure the probability of eligible members retiring during the next year are shown below. These assumptions were first used for the September 30, 2014 valuation of the System.

A Basic member is eligible for normal retirement after attaining age 55 with 30 or more years of credited service, or after attaining age 60 with 10 or more years of credited service.

A MIP member is eligible for normal retirement after 30 years of service, or after attaining age 60 with 5 or more years of service.

A Basic or MIP member is eligible for early retirement after attaining age 55 with 15 but less than 30 years of credited service.

A Pension Plus member is eligible for normal retirement after attaining age 60 with 10 or more years of credited service. Pension Plus members are not eligible for early retirement.

Normal Retirement

Retirement Ages	Percent of Eligible Members Retiring			
	Basic Members		MIP# and Pension Plus Members	
	Teachers	Non-Teachers	Teachers	Non-Teachers
55	25 %	30 %		
56	21	26		
57	16	24		
58	16	22		
59	18	22		
60	18	16	23 %	23 %
61	20	21	20	19
62	26	29	22	24
63	26	29	22	27
64	23	24	22	21
65	22	24	22	23
66	28	35	25	26
67	24	28	22	20
68	21	23	22	20
69	21	25	15	18
70	21	25	15	18
71	21	25	15	18
72	21	25	15	18
73	21	25	15	18
74	21	25	15	18
75 & Over	100	100	100	100
Ref	1727	1728	1730	1732

 # Applies to MIP members with fewer than 30 years of service.

VALUATION ASSUMPTIONS

Normal Retirement

Years of Service	Percent of Eligible Members Retiring — MIP Members with 30+ Years of Service: Teachers	Non-Teachers
30	25 %	25 %
31	25	25
32	25	25
33	18	23
34	19	23
35	19	23
36	21	26
37	25	29
38	23	29
39	27	32
40	30	33
41	30	33
42	30	33
43	30	33
44	30	33
45	30	33
46	30	33
47	30	33
48	30	33
49	30	33
50	100	100
Ref	2352	2353

Early Retirement

Retirement Ages	Percent of Eligible Members Retiring: Basic Members	MIP Members
55	6.5 %	6.5 %
56	6.5	6.5
57	6.5	6.5
58	6.5	6.5
59	6.5	6.5
Ref	2354	2354

VALUATION ASSUMPTIONS

Rates of separation from active membership used in the valuation are shown below (rates do not apply to members eligible to retire and do not include separation on account of death or disability). This assumption measures the probabilities of members remaining in employment, and was first used for the September 30, 2014 valuation of the System.

Sample Ages	Years of Service	Percent Separating Within Next Year			
		Pay More Than $20,000		Pay Less Than $20,000	
		Teachers	Non-Teachers	Teachers	Non-Teachers
All	0	21.00 %	35.00 %	40.00 %	40.00 %
	1	11.00	14.00	28.00	26.00
	2	7.00	8.20	21.00	17.00
	3	6.00	6.80	20.00	14.00
	4	5.00	5.70	19.00	12.00
20	5 & over	3.00	5.00	18.00	12.00
25		3.00	4.76	18.00	12.00
30		2.82	4.24	18.00	11.40
35		2.22	3.40	16.20	10.40
40		1.66	2.70	14.40	8.80
45		1.32	2.20	12.80	7.40
50		1.20	2.00	12.00	6.40
55		1.20	2.00	12.00	6.00
60		1.20	2.00	12.00	6.00
Svc Ref		876	877	878	879
Age Ref		1302	1303	1304	1305

VALUATION ASSUMPTIONS

Rates of disability among active members used in the valuation are shown below, and were first used in the September 30, 2010 valuation of the System. Disabilities are assumed to be non-duty related.

Sample Ages	Percent Becoming Disabled Within Next Year
20	0.00 %
25	0.01
30	0.01
35	0.02
40	0.05
45	0.10
50	0.18
55	0.26
60	0.36
Ref.	393 x 0.80

Service Credit Accrual Rates: Members were assumed to accrue service credit each year as described in the table below:

	Assumed Average Service Credit Accrued Each Year
Teachers with Pay Over $20,000	0.93 years
Non-Teachers with Pay Over $20,000	0.93
Teachers with Pay Under $20,000	0.60
Non-Teachers with Pay Under $20,000	0.65

These accrual rates were first used for the September 30, 2014 valuation of the System.

VALUATION ASSUMPTIONS

Unknown Data:

- Members with unknown gender were assumed to be female.
- Members with unknown dates of birth were assumed to have an entry-age equal to 34 for MIP/PPP and 31 for Basic members.
- Active members with non-zero service who were reported without any annual pay were assumed to have pay equal to the average pay of the corresponding active group.
- Retired members with unknown benefit plan codes were assumed to be MIP.
- Active members with unknown pre-PA 300 benefit plan codes were assumed to be MIPG.
- Allocations of total credited service before and after the PA 300 transition date were approximated when not supplied.
- Frozen defined benefit amounts were estimated for active members who elected to participate in the DC Plan prospectively as a result of PA 300, when not supplied.
- Accrued benefits were estimated for inactive participants based upon the service and final average compensation provided in the data.

MISCELLANEOUS AND TECHNICAL ASSUMPTIONS

Benefit Service	Exact fractional service is used to determine the amount of benefit payable.
Decrement Operation	Disability and withdrawal decrements do not operate during retirement eligibility.
Decrement Timing	Retirement decrements are assumed to occur on July 1. All other decrements are assumed to occur mid-year.
Eligibility Testing	Eligibility for benefits is determined based upon the age nearest birthday and service nearest whole year on the date the decrement is assumed to occur.
Forfeitures	For vested separations from service, it is assumed that 0% of members separating will withdraw their contributions and forfeit an employer financed benefit. It was further assumed that the liability at termination is the greater of the vested deferred benefit (if any) or the member's accumulated contributions.
Incidence of Contributions	Contributions are assumed to be received continuously throughout the year.
Liability Adjustments	Inactive vested member liabilities were increased by 2% to reflect the value of the death benefit provision.
Marriage Assumption	75% of males and 65% of females are assumed to be married for purposes of death-in-service benefits. Male spouses are assumed to be three years older than female spouses for active member valuation purposes.
Normal Form of Benefit	A straight life benefit is the normal form of benefit.
Pay Increase Timing	Pay increases were assumed to be at the beginning of the fiscal year. This is equivalent to assuming that reported pays represent amounts paid to members during the year ended on the valuation date.

MISCELLANEOUS AND TECHNICAL ASSUMPTIONS

OPEB Contribution Refunds For purposes of valuing the liabilities associated with OPEB contribution refunds (that are paid out of the pension plan), the Non-Hybrid investment return is used for Non-Hybrid members and the Hybrid investment return assumption is used for Hybrid members.

Service Purchase Loads The following two loads have been included in the accrued liability to account for service purchases:

$73.6 million for amounts included in the plan's reported assets for purchased service that has not been paid for yet by the members.

$36.9 million estimated for purchased service paid for, but not reported in the valuation. We have estimated this amount based on supplemental data reported for the September 30, 2016 valuation.

Hybrid Normal Cost Load We anticipate that as the Hybrid population matures, it will take on a pay structure (i.e., an evolution of full-time / part-time membership composition) similar to the current Non-Hybrid population. We have developed a load of 0.35% of payroll to be applied to the Hybrid normal cost to account for this expectation.

Reconciliation Payments ORS provided the following schedule of reconciliation payments. For purposes of determining the present value of the reconciliation payments, it was assumed that payments occur in the middle of the fiscal period.

Fiscal Year	Reconciliation Payment
2017	$ 135,826,559
2018	154,016,961
2019	144,256,307
2020	134,495,654
2021	80,259,011
2022	20,186,873

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SECTION F

PLAN PROVISIONS

PLAN PROVISIONS AS OF SEPTEMBER 30, 2016

Our actuarial valuation of the System is based on the present provisions of the Public School Employees' Retirement Act (Act 300 of 1980, as amended).

Regular Retirement (no reduction factor for age):

Eligibility – For Basic members, age 55 with 30 years credited service; or age 60 with 10 years credited service. For Member Investment Plan (MIP) members, any age with 30 years credited service; or age 60 with 10 years credited service; or age 60 with 5 years of credited service provided member worked through 60th birthday and has credited service in each of the last 5 years. For Pension Plus Plan (PPP) members, age 60 with 10 years of credited service.

Mandatory Retirement Age - None.

Transition Date – February 1, 2013 (Basic and MIP members only).

Basic and MIP

Annual Amount – Credited Service as of the Transition Date times 1.5% times Final Average Compensation (FAC),

Plus

An amount determined by the member's election of Option 1, 2, 3 or 4 described below:

Option 1 – Credited Service after the Transition Date times 1.5% times FAC.

Option 2 – Credited Service after the Transition Date (until total service reaches 30 years) times 1.5% times FAC, PLUS Credited Service after the Transition Date and over 30 years times 1.25% times FAC.

Option 3 – Credited Service after the Transition Date times 1.25% times FAC.

Option 4 – None (Member will receive a benefit through a Defined Contribution plan).

PPP

Annual Amount – Credited Service times 1.5% times FAC.

PLAN PROVISIONS AS OF SEPTEMBER 30, 2016

Final Average Compensation (FAC) - Average of highest 60 consecutive months. (36 months for MIP members). FAC is calculated as of the last day worked unless the member elected Option 4, in which case FAC is calculated as of the Transition Date.

Early Retirement (age reduction factor used):

Eligibility - Age 55 with 15 or more (but less than 30) years of credited service and earned credited service in each of the last 5 years. At least 10 of the 15 years of credited service has to be earned service. PPP members are not eligible for early retirement benefits.

Annual Amount - Regular retirement benefit, reduced by 1/2% for each month by which the commencement age is less than 60.

Deferred Retirement (vested benefit):

Eligibility - 10 years of credited service. Benefit commences at the time age qualification is met.

Annual Amount - Regular retirement benefit based on service and final average compensation at time of termination.

Duty Disability Retirement:

Eligibility - No age or service requirement; in receipt of workers' disability compensation.

Annual Amount - Computed as regular retirement benefit with minimum benefit based on 10 years credited service. Additional limitation such that disability benefits plus authorized outside earnings limited to 100% of final average compensation (increased by 2% each year retired).

Non-Duty Disability Retirement:

Eligibility - 10 years of credited service.

Annual Amount - Computed as regular retirement benefit based on credited service and final average compensation at time of disability. Additional limitation such that disability benefits plus authorized outside earnings limited to 100% of final average compensation (increased by 2% each year retired).

PLAN PROVISIONS AS OF SEPTEMBER 30, 2016

Duty Death Before Retirement:

Eligibility – No age or service requirement. Beneficiary is in receipt of workers' compensation. Also applies to "duty disability" retirees during first three years of disability.

Annual Amount – Spouse benefit computed as regular retirement benefit with minimum benefit based on 10 years of credited service, reduced for 100% Survivor election. If no surviving spouse, children under 18 share in benefit; if no spouse or children, a disabled and dependent parent is eligible.

Non-Duty Death Before Retirement:

Eligibility – For Basic members, 15 years of credited service, or age 60 and 10 years of credited service. For MIP members, 10 years of credited service, or age 60 and 5 years of credited service. For PPP members, 10 years of credited service.

Annual Amount - Computed as regular retirement benefit, reduced in accordance with a 100% Survivor election, with payments commencing the first of month following death. For the beneficiary of a deferred member, benefit commences at time member would have attained the minimum age qualification.

Member Contributions before Transition Date (February 1, 2013):

Basic members – None.

MIP members hired before January 1, 1990 - 3.9% of pay.

MIP members hired on or after January 1, 1990 and before July 1, 2008 - 3.0% of first $5,000 of pay, plus 3.6% of next $10,000 of pay, plus 4.3% of pay in excess of $15,000.

MIP members hired on or after July 1, 2008 and PPP members - 3.0% of first $5,000 of pay, plus 3.6% of next $10,000 of pay, plus 6.4% of pay in excess of $15,000.

PLAN PROVISIONS AS OF SEPTEMBER 30, 2016

Member Contributions on or after Transition Date (February 1, 2013):

Basic and MIP Members – Contributions depend on member election of Option 1, 2, or 3. Members electing Option 4 will not contribute to the pension plan.

Option 1 – Basic Members – 4%
All MIP Members – 7%

Option 2 – Contribution as in Option 1 until member reaches 30 years of service. At 30 years of service, contribution reverts to pre-transition date level.

Option 3 – Post transition date contribution is the same as the pre-transition date contribution.

PPP Members – 3.0% of first $5,000 of pay, plus 3.6% of next $10,000 of pay, plus 6.4% of pay in excess of $15,000.

Post-Retirement Cost-of-Living Adjustments:

One-time upward adjustments have been made in 1972, 1974, 1976, and 1977 for members retired on or after July 1, 1956 and prior to July 1, 1976 for members who were eligible for Social Security benefits. For members who retired prior to July 1, 1956 and were not eligible for Social Security benefits based upon membership service, the minimum base pension was increased in 1965, 1971, 1972, 1974, and 1981 and in 1976 and 1977 one-time upward adjustment were made.

Beginning in 1983 some benefit recipients received an annual distribution of investment earnings in excess of 8% (supplemental payment). On January 1, 1986, all members who retired prior to January 1, 1986 were given a permanent 8% increase. On January 1, 1990 a one-time upward adjustment for members who retired prior to October 1, 1981 was made.

Currently members receive annual increases based on the following schedule:

Retired before January 1, 1987 - Greater of supplemental payment or automatic 3% increases.

Retired on or after January 1, 1987 under MIP - Automatic 3% increases only.

Retired on or after January 1, 1987 under Basic plan - Supplemental payment only.

Retired under PPP – No increases.

PLAN PROVISIONS AS OF SEPTEMBER 30, 2016

Member Contributions Attributable to the Retiree Health Plan:

Under Public Act 300 of 2012, members were given the choice between i. and ii. below:

i. Maintaining eligibility for premium subsidy retiree medical coverage, and contributing 3% of their compensation while still working, or
ii. Entering the Personal Healthcare Fund (PHF).

Members not making an election will default into the premium subsidy arrangement.

If a member who elected the subsidy terminates prior to becoming eligible for the subsidy, dies before the total value of the subsidy received equals the total value of contributions made, or retires and declines coverage, the member or beneficiary may request a refund of unused funds. Refunds of member contributions to the healthcare funding account are issued as a supplemental pension benefit (payable at age 60 and payable from the pension plan) paid out over a 60-month period.

SECTION G

GLOSSARY

GLOSSARY

Actuarial Accrued Liability The difference between (i) the actuarial present value of future plan benefits, and (ii) the actuarial present value of future normal cost. Sometimes referred to as "accrued liability" or "past service liability."

Accrued Service The service credited under the plan which was rendered before the date of the actuarial valuation.

Actuarial Assumptions Estimates of future plan experience with respect to rates of mortality, disability, turnover, retirement, rate or rates of investment income and salary increases. Decrement assumptions (rates of mortality, disability, turnover and retirement) are generally based on past experience, often modified for projected changes in conditions. Economic assumptions (salary increases and investment income) consist of an underlying rate in an inflation-free environment plus a provision for a long-term average rate of inflation.

Actuarial Cost Method A mathematical budgeting procedure for allocating the dollar amount of the "actuarial present value of future plan benefits" between the actuarial present value of future normal cost and the actuarial accrued liability. Sometimes referred to as the "actuarial funding method."

Actuarial Equivalent A single amount or series of amounts of equal value to another single amount or series of amounts, computed on the basis of the rate(s) of interest and mortality tables used by the plan.

Actuarial Present Value The amount of funds presently required to provide a payment or series of payments in the future. It is determined by discounting the future payments at a predetermined rate of interest, taking into account the probability of payment.

Amortization Paying off an interest-bearing liability by means of periodic payments of interest and principal, as opposed to paying it off with a lump sum payment.

Experience Gain/(Loss) A measure of the difference between actual experience and that expected based upon a set of actuarial assumptions during the period between two actuarial valuation dates, in accordance with the actuarial cost method being used.

GLOSSARY

Normal Cost	The annual cost assigned, under the actuarial funding method, to current and subsequent plan years. Sometimes referred to as "current service cost." Any payment toward the unfunded actuarial accrued liability is not part of the normal cost.
Reserve Account	An account used to indicate that funds have been set aside for a specific purpose and is not generally available for other uses.
Unfunded Actuarial Accrued Liability	The difference between the actuarial accrued liability and valuation assets. Sometimes referred to as "unfunded accrued liability."
Valuation Assets	The value of current plan assets recognized for valuation purposes. Generally based on market value plus a portion of unrealized appreciation or depreciation.