

**MICHIGAN PUBLIC SCHOOL EMPLOYEES'
RETIREMENT SYSTEM**

**ANNUAL ACTUARIAL VALUATION REPORT
SEPTEMBER 30, 2015**



May 2, 2016

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, 2015**

Dear Board Members:

The results of the September 30, 2015 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 2017-2018 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.

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 otherwise 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 contingency, 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 the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period or additional cost or contribution requirements based on the plan's funded status); and changes in plan provisions or applicable law.

Retirement Board

May 2, 2016

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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 D. Drazilov, ASA, MAAA



Louise M. Gates, ASA, MAAA

MDD/LMG:dj

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EXECUTIVE SUMMARY/BOARD SUMMARY

1. Required Employer Contributions to Support Retirement Benefits

The computed employer contribution for fiscal year 2018 is shown below. Computed contributions are shown as a percentage of active member payroll and as the projected fiscal year 2018 dollar amount.

| | Total Computed Employer Contribution | | |
|--|--------------------------------------|----------------------|------------------|
| | Non-Hybrid Members | Hybrid (PPP) Members | Weighted Average |
| As a Percentage of Active Member Payroll | | | |
| Normal Cost | 3.75 % | 3.07 % | 3.60 % |
| UAAL Amortization Payment | 22.18 | 22.18 | 22.18 |
| As an Annual Dollar Amount | | | |
| Normal Cost | \$ 265,194,200 | \$ 55,019,522 | \$ 320,213,722 |
| UAAL Amortization Payment | 1,596,023,297 | 430,423,598 | 2,026,446,895 |
| Total | \$ 1,861,217,497 | \$ 485,443,120 | \$ 2,346,660,617 |

This valuation report establishes the employer contribution for fiscal year 2018. 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., 3.60%) is expressed as a percentage of the defined benefit (DB) plan payroll, while the UAAL amortization payment rate (i.e., 22.18%) 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, 2015 is presented below:

| | |
|--|------|
| Option 1 - Increase member contributions / 1.5% benefit multiplier after transition date | 22 % |
| 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 | 51 |
| Option 4 - Cease DB member contributions / DC benefit after transition date | 3 |
| Option 5 - Not eligible to make an election or new hire who elected PPP | 18 |
| Option 6 - New hire who elected pure DC plan | 4 |

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 MPERS 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 has been reported to the actuary that the reconciliation process has been reinstated with reconciliation payments beginning in fiscal year 2016. The September 30, 2015 valuation determines the required employer contribution for fiscal year 2018 for both funding and accounting purposes.

The contribution requirements calculated in this report are in addition to any reconciliation payments as required by subsection 41(9) of MPERS 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 | 9/30/2014 | 9/30/2015 |
|----------------------------|----------------|----------------|
| Contribution Percentage | | |
| Normal Cost | 3.65 % | 3.60 % |
| UAAL Amortization Payment | 22.30 | 22.18 |
| Total | N/A | N/A |
| As an Annual Dollar Amount | | |
| Normal Cost | \$ 320,783,953 | \$ 320,213,722 |
| UAAL Amortization Payment | 2,013,428,036 | 2,026,446,895 |
| Total | 2,334,211,989 | 2,346,660,617 |
| Fiscal Year Computed For | 2017 | 2018 |
| Fiscal Year Budgeted For | 2017 | 2018 |

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, 2015. There were no material revisions in assumptions and methods for the year ended September 30, 2015. Experience for the year ended September 30, 2015 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

| Contributions for | September 30 | | | |
|---|--------------------------|------------------------|-----------------------|--------------------------|
| | 2014 | 2015 | | |
| | Total | Non-Hybrid | Hybrid (PPP) | Total |
| (1) Fiscal Year Ending September 30, | 2017 | 2018 | 2018 | 2018 |
| (2) Total Normal Cost of Benefits (as a % of member pay) | 8.28% | 8.40% | 7.90% | 8.29% |
| (3) Member Contribution % (weighted average) | <u>4.63%</u> | <u>4.65%</u> | <u>4.83%</u> | <u>4.69%</u> |
| (4) Employer Normal Cost % = (2) - (3) | 3.65% | 3.75% | 3.07% | 3.60% |
| (5) Projected Active Member Payroll for Fiscal Year - Normal Cost \$ | \$ 8,797,936,997 | \$ 7,071,845,320 | \$ 1,792,166,831 | \$ 8,864,012,151 |
| (6) Employer Normal Cost \$ = (4) x (5) | 320,783,953 | 265,194,200 | 55,019,522 | 320,213,722 |
| (7) Total Accrued Liability | 66,104,591,279 | | | 67,727,577,579 |
| (8) Funding Value of Assets | <u>39,625,615,493</u> | | | <u>41,006,352,969</u> |
| (9) Unfunded Actuarial Accrued Liabilities (UAAL) = (7) - (8) | \$ 26,478,975,786 | | | \$ 26,721,224,610 |
| a. Present Value of Budgeted Early Retirement Incentive Payments | 216,399,291 | | | 218,973,958 |
| b. Present Value of Remaining Early Retirement Incentive Payments | 546,802,896 | | | 470,800,453 |
| c. Present Value of Future Reconciliation Payments | - | | | 495,118,834 |
| d. Net UAAL to be Amortized = (9) - (9a) - (9b) - (9c) | <u>\$ 25,715,773,599</u> | | | <u>\$ 25,536,331,365</u> |
| (10) Amortization Period (years) | 22 | 21 | 21 | 21 |
| (11) Amortization Factor (level percent of payroll payments) | | 13.64920553 | 14.85753438 | |
| (12) Amortization Payment % | 20.94% | 20.82% | 20.82% | 20.82% |
| (13) Early Retirement Incentive Amortization Payment % | 1.36% | 1.36% | 1.36% | 1.36% |
| (14) Total Amortization Payment % = (12) + (13) | 22.30% | 22.18% | 22.18% | 22.18% |
| (15) Projected Active Member Payroll for Fiscal Year - Amortization \$ ⁽¹⁾ | \$ 9,028,825,274 | \$ 7,195,776,811 | \$ 1,940,593,319 | \$ 9,136,370,130 |
| (16) Amortization Payment \$ = (14) x (15) ⁽²⁾ | 2,013,428,036 | 1,596,023,297 | 430,423,598 | 2,026,446,895 |
| (17) Total Computed Employer Contribution \$ = (6) + (16) | \$2,334,211,989 | \$1,861,217,497 | \$ 485,443,120 | \$2,346,660,617 |

⁽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 MPERS active member population, the weighted average normal cost rate is 3.60%. 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 2018, 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 2018 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 2018 payroll for the entire MPERS 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 3.75%. Applying the employer normal cost rate of 3.75% to the projected payroll for MPERS active employees participating in the Non-Hybrid portion of the defined benefit plan for fiscal year 2018 produces annual employer normal cost contributions of \$265,194,200.

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 3.07%. Applying the employer normal cost rate of 3.07% to the projected payroll for MPERS active employees participating in the Hybrid portion of the defined benefit plan for fiscal year 2018 produces annual employer normal cost contributions of \$55,019,522.

CONTRIBUTION REQUIREMENTS

The amortization payment for funding the UAAL (expressed as a % of the total MPERS active member payroll reported for this valuation) is 22.18%. Applying the amortization payment rate of 22.18% to the projected payroll for the total MPERS active employees for fiscal year 2018 produces an annual amortization payment of \$2,026,446,895.

The sum of the two normal cost contributions and the amortization payment yields an expected total employer contribution of \$2,346,660,617 for fiscal year 2018. 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, \$(1,766) should be allocated to the Hybrid group, and \$2,026,448,661 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 has been reported to the actuary that the reconciliation process has been reinstated. The contribution requirements shown on page A-1 for fiscal year 2018 are needed in addition to the reconciliation payments required by subsection 41(9) of the MPERS 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

There have been no material revisions in actuarial assumptions and methods since the last annual actuarial valuation.

Actuarial Experience

Actuarial Experience was more favorable than that anticipated by the actuarial assumptions. The total actuarial gain was \$0.1 billion. The gain was primarily due to recognized investment gains during the last plan year.

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, 2015, the actuarial value of assets was 97% 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 8% investment return assumption.

If the September 30, 2015 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 62.6% (instead of 60.5%), and the UAAL amortization payment would be 20.89% of payroll (instead of 22.18%).

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 |
|------------------------|----------------------------------|------------------------------------|-----------------------------------|
| 9/30/2015 | \$41,006,352,969 | \$67,727,577,579 | 60.5 % |
| 9/30/2014 ¹ | 39,625,615,493 | 66,104,591,279 | 59.9 |
| 9/30/2014 | 39,625,615,493 | 65,050,083,640 | 60.9 |

¹ Revised actuarial assumptions and/or methods.

The chart above illustrates the increase 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 75.8% as of September 30, 2015.

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 |
|------------------------|---------------------------------|---------------------------------|-----------------------------|---------------------------|
| 9/30/2015 | 2018 | 3.60 % | 22.18 % | N/A ² |
| 9/30/2014 ¹ | 2017 | 3.65 | 22.30 | N/A ² |
| 9/30/2014 | 2017 | 4.18 | 21.32 | 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) |
|--------------------|------------------------------|
| 9/30/2015 | \$ 111,195,478 |
| 9/30/2014 | 1,083,635,030 |

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 8.0% 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 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.

SECTION B

FUNDING RESULTS

PRESENT VALUE OF FUTURE BENEFITS AND ACCRUED LIABILITY

**Determination of Unfunded Accrued Liability
as of September 30, 2015**

| | Non-Hybrid | Hybrid (PPP) | Total |
|---|-------------------|---------------------|-------------------|
| A. Accrued Liability | | | |
| 1. For retirees and beneficiaries | \$ 46,538,033,851 | \$ 0 | \$ 46,538,033,851 |
| 2. For vested and other terminated members ¹ | 1,700,467,388 | 10,286,643 | 1,710,754,031 |
| 3. For other inactive members ² | 98,723,413 | 0 | 98,723,413 |
| 4. For present active members | | | |
| a. Value of expected future benefit payments | 24,410,245,052 | 1,027,266,142 | 25,437,511,194 |
| b. Value of future normal costs | 5,196,857,533 | 860,587,377 | 6,057,444,910 |
| c. Active member accrued liability: (a) - (b) | 19,213,387,519 | 166,678,765 | 19,380,066,284 |
| 5. Total accrued liability | 67,550,612,171 | 176,965,408 | 67,727,577,579 |
| B. Present Valuation Assets (Funding Value) | 40,829,364,640 | 176,988,329 | 41,006,352,969 |
| C. Unfunded Accrued Liability: (A.5) - (B) | 26,721,247,531 | (22,921) | 26,721,224,610 |
| D. Funding Ratio: (B) / (A.5) | 60.4% | 100.0% | 60.5% |

¹ Includes liabilities for employees who transferred to the DC pension plan in connection with PA 300.

² 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.

EXPERIENCE GAIN/(LOSS)

A. Derivation of Actuarial Gain/(Loss):

| | |
|---|-------------------|
| 1. Unfunded Actuarial Accrued Liability (UAAL) - Previous Valuation | \$ 26,478,975,786 |
| 2. Total Normal Cost (employer plus member) for Year Ending 9/30/2015 | 666,309,609 |
| 3. Total Contributions (employer plus member) for Year Ending 9/30/2015 | 2,363,332,988 |
| 4. Interest on: | |
| a. UAAL: Discount Rate* x (1) | 2,118,435,920 |
| b. Normal Cost and Contributions: Discount Rate* / 2 x [(2) - (3)] | (67,968,239) |
| c. Net Total: (a) + (b) | 2,050,467,681 |
| 5. Change in UAAL due to Benefit Changes | - |
| 6. Change in UAAL due to Assumption Changes | - |
| 7. Expected UAAL Current Year: | |
| (1) + (2) - (3) + (4c) + (5) + (6) | 26,832,420,088 |
| 8. Actual UAAL Current Year | 26,721,224,610 |
| 9. Experience Gain/(Loss): (7) - (8) | 111,195,478 |
| B. Approximate Portion of Gain/(Loss) due to Investments | 604,308,081 |
| C. Approximate Portion of Gain/(Loss) due to Liabilities: (A.9) - (B) | (493,112,603) |

* 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 the refund of University employer contributions totaling \$112,468,242.

DETAILED EXPERIENCE GAIN/(LOSS)

**Gains/(Losses) During the Year Ended September 30, 2015
Resulting from Differences Between Assumed and Actual Experience**

| TYPE OF ACTIVITY | <u>Gain/(Loss)</u> |
|---|----------------------|
| 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. | \$ 12,375,280 |
| 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. | (52,954,949) |
| 3. Pay Increases. If there are smaller pay increases than assumed, there is a gain. If greater increases, a loss. | (132,111,276) |
| 4. Investment Income. If there is greater investment income than assumed, there is a gain. If less income, a loss. | 604,308,081 |
| 5. Death After Retirement. If retirants and inactive vested members live longer than assumed, there is a loss. If not as long, a gain. | (66,562,272) |
| 6. Rehires. | 8,014,786 |
| 7. Refund of University Employer Contributions. | (112,468,242) |
| 8. Other. Miscellaneous gains and losses resulting from data adjustments, timing of financial transactions, etc. | <u>(149,405,930)</u> |
| 9. Composite Gain/(Loss) During Year. | \$111,195,478 |

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 |
|--|-----------------------------------|---|---|--|
| 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) |
| 2011 | (3,981) | (3,129) | 41,038 | (7.62) |

| Plan Year Ending September 30 | Gain/(Loss) Due to Liabilities | Actuarial Accrued Liability | Liability Gain/(Loss) as % of Accrued Liability |
|--|---|--|--|
| 2015 | \$ (493) | \$ 67,728 | (0.73)% |
| 2014 | 37 | 66,105 | 0.06 |
| 2013 | 462 | 63,840 | 0.72 |
| 2012 | 781 | 62,716 | 1.25 |
| 2011 | (851) | 63,427 | (1.34) |

Please note that for the plan year ending September 30, 2015, the gain/(loss) due to liabilities includes the refund of University employer contributions totaling \$112,468,242.

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 |
|--------------------------------|-----------------------------------|---------------------------------|-----------------|--|---|--|
| 2004 | \$ 47,055 | \$ 38,784 | 82.4 % | \$ 8,271 | \$ 10,465 | 79.0% |
| 2004 ² | 46,317 | 38,784 | 83.7 | 7,533 | 10,407 | 72.4 |
| 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 |

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 | |
|---------------------------------------|-----------------------------------|---|-----------------------|-------------------------|----------------|--|----------|
| | | Non-Hybrid Normal Cost | Hybrid Normal Cost | Amortization Payment | | Computed | Actual |
| 2007 | 2006 ⁴ | 8.15% | | | \$ 10,307.6 | \$ 840.1 | \$ 835.4 |
| 2008 | 2007 | 8.87 | | | 10,318.9 | 915.3 | 999.4 |
| | 2008 | 10.15 | | | 10,412.0 | 1,056.8 | - |
| 2009 | 2008 ³ | 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 ² | 14.99 | | | 9,513.1 | 1,426.0 | - |
| | 2010 ³ | 17.59 | | | 9,513.1 | 1,673.4 | - |
| 2011 | 2010 ^{3,5} | 14.93 | | | 9,513.1 | 1,420.3 | 1,156.1 |
| | 2011 | 20.90 | | | 9,064.2 | 1,894.4 | - |
| 2012 | 2011 ⁵ | 18.24 | | | 9,064.2 | 1,653.3 | 1,454.4 |
| 2013 | 2011 ⁶ | 19.60 | | | 8,793.2 | 1,723.5 | 1,364.1 |
| | 2012 | 26.00 | | | 8,895.1 | 2,312.7 | - |
| | 2012 ² | 25.49 | | | 8,895.1 | 2,267.4 | - |
| 2014 ⁷ | 2012 ^{3,6} | 4.31 % | 3.23 % | 18.76 % | 8,895.1 | 2,004.8 | 1,600.4 |
| 2015 ⁷ | 2012 ^{3,6} | 4.31 | 3.23 | 18.76 | 8,426.8 | 1,917.9 | 1,967.6 |
| 2016 ^{7,8} | 2013 ² | 4.39 | 3.17 | 21.18 | | | |
| | 2014 | 4.41 | 3.13 | 21.32 | | | |
| 2017 ^{7,8} | 2014 ² | 3.76 | 3.13 | 22.30 | | | |
| 2018 ^{7,8} | 2015 | 3.75 | 3.07 | 22.18 | | | |

¹ Revised asset valuation method.

² Revised actuarial assumptions and/or methods.

⁵ Does not include UAAL amortization payment for ERI.

⁶ Incorporates re-amortization of ERI over a 10-year period, rather than a 5-year period.

⁷ Effective with fiscal year 2014, the normal cost rate and the amortization payment rate are applied to different payrolls and cannot be added.

⁸ For the fiscal years ending September 30, 2016 and beyond, the actual payroll and actual contribution are not yet known.

³ Change in plan provisions.

⁴ Interest-only funding adopted for one year only.

HISTORICAL FUNDING LEVELS FOR PRIORITIZED ACTUARIAL ACCRUED LIABILITY

| Valuation Date September 30 | Actuarial Accrued Liability (\$ in Millions) | | | Valuation Assets (\$ in Millions) | Portion of Actuarial Accrued Liability Covered by Assets | | | |
|--------------------------------|---|------------------------------------|---|--------------------------------------|---|-----------|--------|------------------|
| | (1) Active Member Contributions | (2) Retirants and Beneficiaries | (3) Active and Inactive Members (Employer Financed Portion) | | (1) | (2) | (3) | (4) ⁴ |
| | 2004 | \$ 3,800 | \$ 26,178 | | \$ 17,077 | \$ 38,784 | 100.0% | 100.0% |
| 2004 ² | 3,800 | 26,178 | 16,339 | 38,784 | 100.0 | 100.0 | 53.9 | 83.7 |
| 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 |

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)**

| Valuation September 30 | Valuation Assets | Termination Indicator | | Experience Indicator |
|---------------------------|---------------------|---|-----------------|-------------------------|
| | | Actuarial Present Value of Vested Benefits | Funded Ratio | |
| | | 2003 | \$ 38,726 | \$ 37,424 |
| 2004 | 38,784 | 39,659 | 97.8 | (2,001) |
| 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 |

¹ Revised asset valuation method.
² Revised actuarial assumptions and/or methods.
³ Change in plan provisions.

SECTION C
FUND ASSETS

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

| | September 30 | |
|--|----------------------|--------------------|
| | 2014 | 2015 |
| Equity in Common Cash | \$ 160,796,797 | \$ 111,196,402 |
| Total Receivables | 231,097,270 | 255,770,337 |
| Short Term Investment Pools | 2,560,195,320 | 1,678,300,501 |
| Fixed Income Pools | 5,072,380,193 | 5,145,832,400 |
| Domestic Equity Pools | 13,058,737,165 | 11,785,254,521 |
| Real Estate Pool | 4,014,913,204 | 4,265,411,162 |
| Alternative Investment Pools | 7,502,176,175 | 7,113,517,773 |
| International Equity Pools | 6,657,986,146 | 5,823,675,186 |
| Absolute Return Pools | 4,622,296,815 | 6,208,386,971 |
| Securities Lending Collateral less Obligations | <u>(102,748,428)</u> | <u>373,088</u> |
| Total Assets | 43,777,830,657 | 42,387,718,341 |
| Other Liabilities | <u>(4,641,693)</u> | <u>(5,357,469)</u> |
| Net Assets Held in Trust for Pension Benefits | \$43,773,188,964 | \$42,382,360,872 |

Note: Asset amounts exclude assets held for health benefits.

RECONCILIATION OF PLAN ASSETS

| | September 30, 2014 | | | September 30, 2015 | | |
|---|-------------------------|---------------------|------------------|-------------------------|---------------------|--------------------|
| | <u>Non-Pension Plus</u> | <u>Pension Plus</u> | <u>Total</u> | <u>Non-Pension Plus</u> | <u>Pension Plus</u> | <u>Total</u> |
| Market Value, Beginning of Year | \$39,944,214,960 | \$ 71,324,656 | \$40,015,539,616 | \$43,638,174,660 | \$ 135,014,304 | \$43,773,188,964 |
| Additions | | | | | | |
| Member Contributions | 381,152,795 | 24,290,977 | 405,443,772 | 365,145,605 | 30,576,687 | 395,722,292 |
| Employer Contributions | 1,575,385,927 | 24,989,205 | 1,600,375,132 | 1,957,258,280 | 10,352,416 | 1,967,610,696 |
| Net Investment Income* | 6,177,460,628 | 15,250,232 | 6,192,710,860 | 934,735,967 | 3,407,073 | 938,143,040 |
| Audit Adjustment | <u>0</u> | <u>0</u> | <u>0</u> | <u>0</u> | <u>0</u> | <u>0</u> |
| Total Additions | 8,133,999,350 | 64,530,414 | 8,198,529,764 | 3,257,139,852 | 44,336,176 | 3,301,476,028 |
| Deductions | | | | | | |
| Benefit Payments | 4,388,328,518 | 0 | 4,388,328,518 | 4,530,914,738 | 0 | 4,530,914,738 |
| Contribution Refunds/Transfers | 28,058,275 | 782,374 | 28,840,649 | 23,459,269 | 974,546 | 24,433,815 |
| Administrative Expenses* | 23,652,857 | 58,392 | 23,711,249 | 24,398,394 | 88,931 | 24,487,325 |
| University Employer Contribution Refund | <u>0</u> | <u>0</u> | <u>0</u> | <u>112,468,242</u> | <u>0</u> | <u>112,468,242</u> |
| Total Deductions | 4,440,039,650 | 840,766 | 4,440,880,416 | 4,691,240,643 | 1,063,477 | 4,692,304,120 |
| Market Value, End of Year | \$43,638,174,660 | \$ 135,014,304 | \$43,773,188,964 | \$42,204,073,869 | \$ 178,287,003 | \$42,382,360,872 |

* Net investment income and administrative expenses are allocated between Pension Plus and Non-Pension Plus assets, since this information was not provided.

MPSERS Annual Actuarial Valuation

DEVELOPMENT OF VALUATION ASSETS – NON-HYBRID

| | 2015 | 2016 | 2017 | 2018 | 2019 |
|--|-------------------|------------------|------------------|------------------|------------------|
| 1. Beginning of Year Assets | | | | | |
| a. Market Value | \$ 43,638,174,660 | | | | |
| b. Valuation Assets | 39,500,051,337 | | | | |
| 2. End of Year Assets at Market Value | 42,204,073,869 | | | | |
| 3. Net Additions to Market Value | | | | | |
| a. Member Contributions | 365,145,605 | | | | |
| b. Employer Contributions | 1,957,258,280 | | | | |
| c. Investment Income | 934,735,967 | | | | |
| d. Benefit Payments | (4,530,914,738) | | | | |
| e. Contribution Refunds/Transfers | (23,459,269) | | | | |
| f. Administrative Expenses | (24,398,394) | | | | |
| g. Transfer (to) from stabilization subaccount | 0 | | | | |
| h. University Employer Contribution Refund ¹ | (112,468,242) | | | | |
| i. Audit Adjustment | 0 | | | | |
| j. Total Additions to Market Value | (1,434,100,791) | | | | |
| 4. Summary of Net Additions to Market Value | | | | | |
| a. Net Contributions and Transfers = 3a + 3b + 3e + 3g | 2,298,944,616 | | | | |
| b. Net Investment Income = 3c + 3f | 910,337,573 | | | | |
| c. Benefit Payments = 3d | (4,530,914,738) | | | | |
| d. University Employer Contribution Refund = 3h ¹ | (112,468,242) | | | | |
| e. Audit Adjustment = 3i | 0 | | | | |
| f. Total Additions to Market Value | (1,434,100,791) | | | | |
| 5. Average Valuation Assets = | | | | | |
| 1b + .5 x (4a + 4c) + 4e | 38,384,066,276 | | | | |
| 6. Imputed Income at Valuation Rate = 8.00% x 5 | 3,070,725,302 | | | | |
| 7. Gain (Loss) from Investments = 4b - 6 | (2,160,387,729) | | | | |
| 8. Portion of Gains (Losses) Recognized from Prior Years | | | | | |
| a. From this year = .2 * 7 | (432,077,546) | | | | |
| b. From one year ago | 642,831,577 | \$ (432,077,546) | | | |
| c. From two years ago | 371,421,574 | 642,831,577 | \$ (432,077,546) | | |
| d. From three years ago | 431,681,532 | 371,421,574 | 642,831,577 | \$ (432,077,546) | |
| e. From four years ago | (410,830,772) | 431,681,532 | 371,421,576 | 642,831,576 | \$ (432,077,545) |
| f. Total | 603,026,365 | 1,013,857,137 | 582,175,607 | 210,754,030 | (432,077,545) |
| 9. Change in Valuation Assets = 4a + 4c + 4d + 4e + 6 + 8f | 1,329,313,303 | | | | |
| 10. End of Year Assets | | | | | |
| a. Market Value = 2 | 42,204,073,869 | | | | |
| b. Valuation Assets | | | | | |
| b1. Preliminary Valuation Assets = 1b + 9 | 40,829,364,640 | | | | |
| b2. Corridor Percent | 30% | | | | |
| b3. Upper Corridor Limit: (100% + 10b2) x 10a | 54,865,296,030 | | | | |
| b4. Lower Corridor Limit: (100% - 10b2) x 10a | 29,542,851,708 | | | | |
| b5. Final Valuation Assets | 40,829,364,640 | | | | |
| 11. Actuarial Rate of Return | 9.57% | | | | |
| 12. Market Rate of Return | 2.14% | | | | |

¹ The University Employer Contribution Refund occurred at the end of the fiscal year.

MPSERS Annual Actuarial Valuation

DEVELOPMENT OF VALUATION ASSETS – NON-HYBRID (CONCLUDED)

| | 2010 | 2011 | 2012 | 2013 | 2014 |
|--|-------------------|-------------------|-------------------|-------------------|-------------------|
| 1. Beginning of Year Assets | | | | | |
| a. Market Value | \$ 34,498,379,563 | \$ 35,855,301,533 | \$ 34,664,520,519 | \$ 37,670,648,117 | \$ 39,944,214,960 |
| b. Valuation Assets | 44,702,878,189 | 43,293,601,522 | 41,027,934,880 | 38,421,416,945 | 37,975,547,627 |
| 2. End of Year Assets at Market Value | 35,855,301,533 | 34,664,520,519 | 37,670,648,117 | 39,944,214,960 | 43,638,174,660 |
| 3. Net Additions to Market Value | | | | | |
| a. Member Contributions | 377,732,355 | 325,857,955 | 324,327,745 | 367,423,484 | 381,152,795 |
| b. Employer Contributions | 1,001,100,625 | 1,152,612,768 | 1,448,682,399 | 1,345,883,238 | 1,575,385,927 |
| c. Investment Income | 3,563,017,031 | 1,332,252,870 | 5,384,106,432 | 4,853,588,768 | 6,177,460,628 |
| d. Benefit Payments | (3,525,020,341) | (3,942,027,101) | (4,082,242,506) | (4,238,482,066) | (4,388,328,518) |
| e. Contribution Refunds/Transfers | (33,907,066) | (36,554,464) | (31,647,304) | (29,876,949) | (28,058,275) |
| f. Administrative Expenses | (26,000,634) | (22,923,042) | (37,099,168) | (24,969,632) | (23,652,857) |
| 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 | 1,356,921,970 | (1,190,781,014) | 3,006,127,598 | 2,273,566,843 | 3,693,959,700 |
| 4. Summary of Net Additions to Market Value | | | | | |
| a. Net Contributions and Transfers = 3a + 3b + 3e + 3g | 1,344,925,914 | 1,441,916,259 | 1,741,362,840 | 1,683,429,773 | 1,928,480,447 |
| b. Net Investment Income = 3c + 3f | 3,537,016,397 | 1,309,329,828 | 5,347,007,264 | 4,828,619,136 | 6,153,807,771 |
| c. Benefit Payments = 3d | (3,525,020,341) | (3,942,027,101) | (4,082,242,506) | (4,238,482,066) | (4,388,328,518) |
| 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 | 1,356,921,970 | (1,190,781,014) | 3,006,127,598 | 2,273,566,843 | 3,693,959,700 |
| 5. Average Valuation Assets = 1b + .5 x (4a + 4c) + 4e | 43,612,830,975 | 42,043,546,101 | 39,857,495,047 | 37,143,890,798 | 36,745,623,591 |
| 6. Imputed Income at Valuation Rate = 8.00% x 5 | 3,489,026,478 | 3,363,483,688 | 3,188,599,604 | 2,971,511,264 | 2,939,649,887 |
| 7. Gain (Loss) from Investments = 4b - 6 | 47,989,919 | (2,054,153,860) | 2,158,407,660 | 1,857,107,872 | 3,214,157,884 |
| 8. Portion of Gains (Losses) Recognized from Prior Years | | | | | |
| a. From this year = .2 * 7 | 9,597,984 | (410,830,772) | 431,681,532 | 371,421,574 | 642,831,577 |
| b. From one year ago | (1,264,198,605) | 9,597,984 | (410,830,772) | 431,681,532 | 371,421,574 |
| c. From two years ago | (2,220,488,012) | (1,264,198,605) | 9,597,984 | (410,830,772) | 431,681,532 |
| d. From three years ago | 756,879,915 | (2,220,488,012) | (1,264,198,605) | 9,597,984 | (410,830,772) |
| e. From four years ago | 0 | 756,879,917 | (2,220,488,012) | (1,264,198,607) | 9,597,983 |
| f. Total | (2,718,208,718) | (3,129,039,488) | (3,454,237,873) | (862,328,289) | 1,044,701,894 |
| 9. Change in Valuation Assets = 4a + 4c + 4d + 4e + 6 + 8f | (1,409,276,667) | (2,265,666,642) | (2,606,517,935) | (445,869,318) | 1,524,503,710 |
| 10. End of Year Assets | | | | | |
| a. Market Value = 2 | 35,855,301,533 | 34,664,520,519 | 37,670,648,117 | 39,944,214,960 | 43,638,174,660 |
| b. Valuation Assets | | | | | |
| b1. Preliminary Valuation Assets = 1b + 9 | 43,293,601,522 | 41,027,934,880 | 38,421,416,945 | 37,975,547,627 | 39,500,051,337 |
| b2. Corridor Percent | | | | | 30% |
| b3. Upper Corridor Limit: (100% + 10b2) x 10a | | | | | 56,729,627,058 |
| b4. Lower Corridor Limit: (100% - 10b2) x 10a | | | | | 30,546,722,262 |
| b5. Final Valuation Assets | 43,293,601,522 | 41,027,934,880 | 38,421,416,945 | 37,975,547,627 | 39,500,051,337 |
| 11. Actuarial Rate of Return | 1.77% | 0.56% | (0.67)% | 5.68% | 10.84% |
| 12. Market Rate of Return | 10.59% | 3.78% | 15.96% | 13.27% | 15.90% |

¹ The University Employer Contribution Refund occurred at the end of the fiscal year.

MPERS Annual Actuarial Valuation

DEVELOPMENT OF VALUATION ASSETS – HYBRID

| | 2015 | 2016 | 2017 | 2018 | 2019 |
|--|----------------|----------------|----------------|----------------|----------------|
| 1. Beginning of Year Assets | | | | | |
| a. Market Value | \$ 135,014,304 | | | | |
| b. Valuation Assets | 125,564,156 | | | | |
| 2. End of Year Assets at Market Value | 178,287,003 | | | | |
| 3. Net Additions to Market Value | | | | | |
| a. Member Contributions | 30,576,687 | | | | |
| b. Employer Contributions | 10,352,416 | | | | |
| c. Investment Income | 3,407,073 | | | | |
| d. Benefit Payments | 0 | | | | |
| e. Contribution Refunds/Transfers | (974,546) | | | | |
| f. Administrative Expenses | (88,931) | | | | |
| g. Transfer (to) from stabilization subaccount | 0 | | | | |
| h. University Employer Contribution Refund ¹ | 0 | | | | |
| i. Audit Adjustment | 0 | | | | |
| j. Total Additions to Market Value | 43,272,699 | | | | |
| 4. Summary of Net Additions to Market Value | | | | | |
| a. Net Contributions and Transfers = 3a + 3b + 3e + 3g | 39,954,557 | | | | |
| b. Net Investment Income = 3c + 3f | 3,318,142 | | | | |
| c. Benefit Payments = 3d | 0 | | | | |
| d. University Employer Contribution Refund = 3h ¹ | 0 | | | | |
| e. Audit Adjustment = 3i | 0 | | | | |
| f. Total Additions to Market Value | 43,272,699 | | | | |
| 5. Average Valuation Assets = | | | | | |
| 1b + .5 x (4a + 4c) + 4e | 145,541,435 | | | | |
| 6. Imputed Income at Valuation Rate = 7.00% x 5 | 10,187,900 | | | | |
| 7. Gain (Loss) from Investments = 4b - 6 | (6,869,758) | | | | |
| 8. Portion of Gains (Losses) Recognized from Prior Years | | | | | |
| a. From this year = .2 * 7 | (1,373,952) | | | | |
| b. From one year ago | 1,747,501 | \$ (1,373,952) | | | |
| c. From two years ago | 611,291 | 1,747,501 | \$ (1,373,952) | | |
| d. From three years ago | 329,396 | 611,291 | 1,747,501 | \$ (1,373,952) | |
| e. From four years ago | (32,520) | 329,398 | 611,290 | 1,747,499 | \$ (1,373,950) |
| f. Total | 1,281,716 | 1,314,238 | 984,839 | 373,547 | (1,373,950) |
| 9. Change in Valuation Assets = 4a + 4c + 4d + 4e + 6 + 8f | 51,424,173 | | | | |
| 10. End of Year Assets | | | | | |
| a. Market Value = 2 | 178,287,003 | | | | |
| b. Valuation Assets | | | | | |
| b1. Preliminary Valuation Assets = 1b + 9 | 176,988,329 | | | | |
| b2. Corridor Percent | 30% | | | | |
| b3. Upper Corridor Limit: (100% + 10b2) x 10a | 231,773,104 | | | | |
| b4. Lower Corridor Limit: (100% - 10b2) x 10a | 124,800,902 | | | | |
| b5. Final Valuation Assets | 176,988,329 | | | | |
| 11. Actuarial Rate of Return | 7.88% | | | | |
| 12. Market Rate of Return | 2.14% | | | | |

¹ The University Employer Contribution Refund occurred at the end of the fiscal year.

MPERS Annual Actuarial Valuation

DEVELOPMENT OF VALUATION ASSETS – HYBRID (CONCLUDED)

| | 2010 | 2011 | 2012 | 2013 | 2014 |
|--|---------|------------|---------------|---------------|---------------|
| 1. Beginning of Year Assets | | | | | |
| a. Market Value | \$ 0 | \$ 176,312 | \$ 10,132,876 | \$ 29,763,844 | \$ 71,324,656 |
| b. Valuation Assets | 0 | 174,579 | 10,261,650 | 28,542,947 | 67,955,907 |
| 2. End of Year Assets at Market Value | 176,312 | 10,132,876 | 29,763,844 | 71,324,656 | 135,014,304 |
| 3. Net Additions to Market Value | | | | | |
| a. Member Contributions | 16,400 | 6,351,179 | 11,143,134 | 17,584,103 | 24,290,977 |
| b. Employer Contributions | 151,048 | 3,448,135 | 5,756,508 | 18,253,224 | 24,989,205 |
| c. Investment Income | 8,929 | 194,760 | 2,969,623 | 6,321,496 | 15,250,232 |
| d. Benefit Payments | 0 | 0 | 0 | 0 | 0 |
| e. Contribution Refunds/Transfers | 0 | (34,159) | (217,835) | (565,490) | (782,374) |
| f. Administrative Expenses | (65) | (3,351) | (20,462) | (32,521) | (58,392) |
| 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 | 176,312 | 9,956,564 | 19,630,968 | 41,560,812 | 63,689,648 |
| 4. Summary of Net Additions to Market Value | | | | | |
| a. Net Contributions and Transfers = 3a + 3b + 3e + 3g | 167,448 | 9,765,155 | 16,681,807 | 35,271,837 | 48,497,808 |
| b. Net Investment Income = 3c + 3f | 8,864 | 191,409 | 2,949,161 | 6,288,975 | 15,191,840 |
| 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 | 176,312 | 9,956,564 | 19,630,968 | 41,560,812 | 63,689,648 |
| 5. Average Valuation Assets = | | | | | |
| 1b + .5 x (4a + 4c) + 4e | 83,724 | 5,057,157 | 18,602,554 | 46,178,866 | 92,204,811 |
| 6. Imputed Income at Valuation Rate = 7.00% x 5 | 6,698 | 354,001 | 1,302,179 | 3,232,521 | 6,454,337 |
| 7. Gain (Loss) from Investments = 4b - 6 | 2,166 | (162,592) | 1,646,982 | 3,056,454 | 8,737,503 |
| 8. Portion of Gains (Losses) Recognized from Prior Years | | | | | |
| a. From this year = .2 * 7 | 433 | (32,518) | 329,396 | 611,291 | 1,747,501 |
| b. From one year ago | 0 | 433 | (32,518) | 329,396 | 611,291 |
| c. From two years ago | 0 | 0 | 433 | (32,518) | 329,396 |
| d. From three years ago | 0 | 0 | 0 | 433 | (32,518) |
| e. From four years ago | 0 | 0 | 0 | 0 | 434 |
| f. Total | 433 | (32,085) | 297,311 | 908,602 | 2,656,104 |
| 9. Change in Valuation Assets = 4a + 4c + 4d + 4e + 6 + 8f | 174,579 | 10,087,071 | 18,281,297 | 39,412,960 | 57,608,249 |
| 10. End of Year Assets | | | | | |
| a. Market Value = 2 | 176,312 | 10,132,876 | 29,763,844 | 71,324,656 | 135,014,304 |
| b. Valuation Assets | | | | | |
| b1. Preliminary Valuation Assets = 1b + 9 | 174,579 | 10,261,650 | 28,542,947 | 67,955,907 | 125,564,156 |
| b2. Corridor Percent | | | | | 30% |
| b3. Upper Corridor Limit: (100% + 10b2) x 10a | | | | | 175,518,595 |
| b4. Lower Corridor Limit: (100% - 10b2) x 10a | | | | | 94,510,013 |
| b5. Final Valuation Assets | 174,579 | 10,261,650 | 28,542,947 | 67,955,907 | 125,564,156 |
| 11. Actuarial Rate of Return | 8.52% | 6.37% | 8.60% | 8.97% | 9.88% |
| 12. Market Rate of Return | 10.59% | 3.78% | 15.96% | 13.27% | 15.90% |

¹ The University Employer Contribution Refund occurred at the end of the fiscal year.

HISTORY OF APPROXIMATE INVESTMENT RETURN RATES

| Plan Year Ending September 30 | Approximate Rate of Return ¹ | | |
|----------------------------------|---|-------------------------|---------------------------|
| | Market | Non-Hybrid Actuarial | Hybrid (PPP) Actuarial |
| 2006 | 12.69 % | 7.46 % | |
| 2006 ² | 12.69 | 15.70 ² | |
| 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 |
| Average Returns: | | | |
| Last five years: | 10.04 % | 5.09 % | 8.33 % |
| Last ten years: | 6.27 % | 5.87 % | 8.36 % |

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 (see previous two pages).

² After adjusting to market value as of September 30, 2006.

HISTORICAL GROWTH OF ASSETS AT MARKET VALUE

| Fiscal Year Ended September 30 | Revenues by Source | | | Expenses by Type | | | Market Value of Assets |
|--------------------------------|----------------------|------------------------|------------------------------------|---------------------|---------------------------------------|-------------------------|------------------------|
| | Member Contributions | Employer Contributions | Net Investment Income ¹ | Retirement Benefits | Return of Contributions and Transfers | Administrative Expenses | |
| 1996 | \$ 255,085,948 | \$ 829,601,695 | \$ 6,675,359,302 ² | \$ 1,268,260,318 | \$ 11,638,709 | \$ 10,381,801 | \$ 24,453,013,932 |
| 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 |

¹ Includes miscellaneous income.

² Includes other changes in net assets/reserves/fund balances and, in 1996, a \$3,405,165,438 cumulative adjustment due to GASB Statements No. 25 and No. 26.

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 | |
|---|---------------------------|-----------------------|
| | 2014 | 2015 |
| Retirees and beneficiaries currently receiving benefits: | | |
| Regular benefits | 181,489 | 184,496 |
| Survivor benefits | 16,855 | 16,960 |
| Disability benefits | <u>6,168</u> | <u>6,195</u> |
| Total | 204,512 | 207,651 |
| Current Employees: | | |
| Vested | 107,791 | 105,474 |
| Non-Vested | <u>91,883</u> | <u>89,483</u> |
| Total | 199,674 | 194,957 |
| Inactive employees entitled to benefits and not yet receiving them: | <u>23,140</u> | <u>22,717</u> |
| Total Participants | <u><u>427,326</u></u> | <u><u>425,325</u></u> |

The September 30, 2014 inactive counts include 6,161 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 4,942 people hired after PA 300 who elected to participate in the pure defined contribution plan.

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.

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 | | Annual % Increase | | Average Annual Benefit |
|----------------------------|-------------------|--------------------------------|-------------------|----------|------------------------------|
| | Number | Annual Benefit ¹ | Number | Benefits | |
| | | | | | |
| 1996 | 107,465 | \$ 1,251,811 | 4.2% | 9.6% | \$ 11,649 |
| 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 |

¹ In thousands of dollars.

**RETIREES AND BENEFICIARIES
AS OF SEPTEMBER 30, 2015
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 | 12,442 | 10,886 | 1,065 | 73 | 290 | 3 | 125 | 6,676 | 2,983 | 1,743 | 202 | 838 |
| 201 - 400 | 22,486 | 19,418 | 1,381 | 116 | 1,243 | 2 | 326 | 12,290 | 4,711 | 3,753 | 529 | 1,203 |
| 401 - 600 | 17,470 | 14,645 | 1,132 | 94 | 1,245 | 1 | 353 | 9,144 | 3,648 | 3,217 | 504 | 957 |
| 601 - 800 | 13,391 | 11,132 | 866 | 71 | 969 | 1 | 352 | 6,815 | 2,697 | 2,532 | 499 | 848 |
| 801 - 1,000 | 11,117 | 9,190 | 788 | 44 | 770 | 1 | 324 | 5,293 | 2,301 | 2,251 | 475 | 797 |
| 1,001 - 1,200 | 9,717 | 8,061 | 793 | 21 | 563 | 0 | 279 | 4,346 | 2,091 | 2,008 | 443 | 829 |
| 1,201 - 1,400 | 8,677 | 7,112 | 844 | 13 | 469 | 0 | 239 | 3,754 | 1,818 | 1,688 | 461 | 956 |
| 1,401 - 1,600 | 8,173 | 6,795 | 789 | 13 | 346 | 0 | 230 | 3,324 | 1,671 | 1,631 | 426 | 1,121 |
| 1,601 - 1,800 | 7,977 | 6,810 | 673 | 5 | 292 | 0 | 197 | 3,037 | 1,636 | 1,484 | 459 | 1,361 |
| 1,801 - 2,000 | 7,835 | 6,847 | 547 | 6 | 259 | 1 | 175 | 2,892 | 1,631 | 1,450 | 489 | 1,373 |
| Over 2,000 | 88,366 | 83,600 | 3,300 | 9 | 641 | 2 | 814 | 38,674 | 16,940 | 17,889 | 6,937 | 7,926 |
| Totals | 207,651 | 184,496 | 12,178 | 465 | 7,087 | 11 | 3,414 | 96,245 | 42,127 | 39,646 | 11,424 | 18,209 |

*** 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, 2014 | September 30, 2015 |
|----------------------|--------------------|--------------------|
| Basic Members | | |
| Number | 19,708 | 17,512 |
| Average Age | 55.1 years | 55.6 years |
| Average Service | 24.7 years | 25.1 years |
| Reported Payroll | \$ 1,050,066,358 | \$ 961,697,984 |
| Average Annual Pay | \$ 53,281 | \$ 54,917 |
| MIP Members | | |
| Number | 147,114 | 139,406 |
| Average Age | 47.0 years | 47.5 years |
| Average Service | 13.6 years | 14.3 years |
| Reported Payroll | \$ 6,314,492,995 | \$ 6,301,381,830 |
| Average Annual Pay | \$ 42,922 | \$ 45,202 |
| PPP Members | | |
| Number | 32,852 | 38,039 |
| Average Age | 36.5 years | 36.6 years |
| Average Service | 1.4 years | 1.7 years |
| Reported Payroll | \$ 579,362,301 | \$ 741,929,210 |
| Average Annual Pay | \$ 17,636 | \$ 19,504 |
| Total | | |
| Number | 199,674 | 194,957 |
| Average Age | 46.1 years | 46.1 years |
| Average Service | 12.7 years | 12.8 years |
| Reported Payroll | \$ 7,943,921,654 | \$ 8,005,009,024 |
| Average Annual Pay | \$ 39,784 | \$ 41,060 |

The above active statistics exclude active members hired after PA 300 who elected the pure defined contribution plan (4,942 as of September 1, 2014 and 7,914 as of September 1, 2015). 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 (6,161 as of September 1, 2014 and 5,272 as of September 1, 2015). The September 30, 2015 active statistics exclude 2,831 people provided in the valuation with both \$0 salary and 0 service. Annual reported payroll for those employees excluded from the active statistics (above) are \$258.9 million as of September 30, 2015 (\$222.8 million as of September 30, 2014).

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, 2015
by Age and Years of Service**

| Age | Years of Service | | | | | | | Total Count | Total Pay | Average Pay |
|--------------|------------------|---------------|---------------|---------------|---------------|---------------|--------------|----------------|-------------------------|------------------|
| | 0 - 4 | 5 - 9 | 10 - 14 | 15 - 19 | 20 - 24 | 25 - 29 | 30 & up | | | |
| Under 20 | 180 | | | | | | | 180 | \$ 1,975,388 | \$ 10,974 |
| 20 - 24 | 4,922 | 6 | | | | | | 4,928 | 61,116,617 | 12,402 |
| 25 - 29 | 10,589 | 1,345 | 7 | | | | | 11,941 | 314,513,122 | 26,339 |
| 30 - 34 | 8,236 | 6,878 | 1,187 | 725 | | | | 17,026 | 608,127,590 | 35,718 |
| 35 - 39 | 7,105 | 4,149 | 4,238 | 6,319 | 1,073 | | | 22,884 | 1,033,434,241 | 45,160 |
| 40 - 44 | 7,138 | 3,528 | 2,916 | 6,852 | 5,789 | 489 | | 26,712 | 1,299,724,754 | 48,657 |
| 45 - 49 | 6,850 | 4,063 | 3,346 | 4,692 | 7,144 | 3,808 | 264 | 30,167 | 1,430,939,957 | 47,434 |
| 50 - 54 | 5,665 | 4,061 | 3,972 | 5,052 | 4,332 | 5,195 | 2,112 | 30,389 | 1,290,211,645 | 42,457 |
| 55 - 59 | 4,184 | 3,080 | 3,725 | 5,465 | 4,651 | 3,682 | 3,636 | 28,423 | 1,139,282,579 | 40,083 |
| 60 - 64 | 2,709 | 1,689 | 1,739 | 2,551 | 2,664 | 2,043 | 2,593 | 15,988 | 637,968,334 | 39,903 |
| 65 - 69 | 1,303 | 695 | 451 | 477 | 491 | 449 | 648 | 4,514 | 149,643,433 | 33,151 |
| 70 & Over | 758 | 350 | 208 | 132 | 79 | 73 | 205 | 1,805 | 38,071,364 | 21,092 |
| Total | 59,639 | 29,844 | 21,789 | 32,265 | 26,223 | 15,739 | 9,458 | 194,957 | \$ 8,005,009,024 | \$ 41,060 |

The September 30, 2015 active statistics exclude: (1) 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 PA 300, (2) 7,914 people hired after PA 300 who elected the pure defined contribution plan, and (3) 2,831 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 | | | | | |
|--------------------------------|--|-----------------------------|----------------------------------|---------------|---------------|------|---------------------|
| | | Number | Reported Payroll ¹ | Average | | | Years of Service |
| | | | | Annual Pay | % Increase | Age | |
| 1996 | * | 295,096 | \$ 7,807,029 | \$ 26,456 | 3.1 % | 43.6 | 9.9 |
| 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 ³ | 22,717 | 194,957 | 8,005,009 | 41,060 | 3.2 | 46.1 | 12.8 |

* 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, 2015 inactive vested statistic includes 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 PA 300. The September 30, 2015 active statistics exclude these members as well as 7,914 people hired after PA 300 who elected the pure defined contribution plan and 2,831 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 MPERS 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 MPERS 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 MPERS covering the period October 1, 2007 through September 30, 2012. A report dated May 7, 2014 presented the results of the Experience Study. The actuarial assumptions represent estimates of future experience.

The rate of investment return was 8.0% 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 assumed real 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 8.0% nominal rate of investment return translates into a real rate of investment return of 4.5% over wage inflation and 5.5% 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 35 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

| | |
|--|---|
| <i>Benefit Service</i> | Exact fractional service is used to determine the amount of benefit payable. |
| <i>Decrement Operation</i> | Disability and withdrawal decrements do not operate during retirement eligibility. |
| <i>Decrement Timing</i> | Retirement decrements are assumed to occur on July 1. All other decrements are assumed to occur mid-year. |
| <i>Eligibility Testing</i> | 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. |
| <i>Forfeitures</i> | 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. |
| <i>Incidence of Contributions</i> | Contributions are assumed to be received continuously throughout the year. |
| <i>Liability Adjustments</i> | Inactive vested member liabilities were increased by 2% to reflect the value of the death benefit provision. |
| <i>Marriage Assumption</i> | 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. |
| <i>Normal Form of Benefit</i> | A straight life benefit is the normal form of benefit. |
| <i>Pay Increase Timing</i> | 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:

\$92.5 million for amounts included in the plan’s reported assets for purchased service that has not been paid for yet by the members.

\$57.9 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, 2015 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 |
|-------------|------------------------|
| 2016 | \$ 63,007,651 |
| 2017 | 135,826,560 |
| 2018 | 127,618,742 |
| 2019 | 119,410,925 |
| 2020 | 111,203,108 |
| 2021 | 58,519,302 |

SECTION F
PLAN PROVISIONS

PLAN PROVISIONS AS OF SEPTEMBER 30, 2015

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, 2015

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, 2015

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, 2015

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, 2015

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

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| <i>Actuarial Accrued Liability</i> | 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.” |
| <i>Accrued Service</i> | The service credited under the plan which was rendered before the date of the actuarial valuation. |
| <i>Actuarial Assumptions</i> | 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. |
| <i>Actuarial Cost Method</i> | 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.” |
| <i>Actuarial Equivalent</i> | 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. |
| <i>Actuarial Present Value</i> | 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. |
| <i>Amortization</i> | 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. |
| <i>Experience Gain/(Loss)</i> | 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

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| <i>Normal Cost</i> | 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. |
| <i>Reserve Account</i> | An account used to indicate that funds have been set aside for a specific purpose and is not generally available for other uses. |
| <i>Unfunded Actuarial Accrued Liability</i> | The difference between the actuarial accrued liability and valuation assets. Sometimes referred to as “unfunded accrued liability.” |
| <i>Valuation Assets</i> | The value of current plan assets recognized for valuation purposes. Generally based on market value plus a portion of unrealized appreciation or depreciation. |