

July 2, 2019 - DRAFT

Ms. Kerrie Vanden Bosch
Director, Office of Retirement Services
530 W. Allegan
Lansing, Michigan 48933

Re: Separate Actuarial Valuation as of September 30, 2018 for University Members of MPSERS (Pension Benefits Only)

Dear Ms. Vanden Bosch:

We have completed a separate actuarial valuation for current and former employees of the seven Michigan Universities that have withdrawn from the Michigan Public School Employees Retirement System (for their employees hired on or after January 1, 1996) due to the enactment of Act No. 272 of the Public Acts of 1995. This actuarial valuation was prepared as of September 30, 2018, and utilized the same actuarial assumptions and methods used for the 2018 valuation of MPSERS, except that the unfunded actuarial accrued liability for University members is expected to be completely amortized by September 30, 2036.

The purpose of the valuation is to provide the required contribution rates for the fiscal year beginning October 1, 2020 and to evaluate the liabilities and funded status of the System for the affected members in total. This report should not be relied upon for any other purpose.

Select valuation results are presented in the following tables:

- Table 1 - Demographic Characteristics - Comparison of University and Non-University MPSERS Members as of September 30, 2018 and September 30, 2017
- Table 2 - Contribution Rates for the Indicated Fiscal Years Expressed as a Percentage of Payroll
- Table 3 - University Contribution Rates as of September 30, 2018 for the Fiscal Year Beginning October 1, 2020 – Expressed as a Percentage of Payroll and Estimated Dollars
- Table 4 - Actuarial Valuation Results as of September 30, 2018
- Table 5 - Active University MPSERS Members as of September 30, 2018 by Age and Years of Service
- Table 6 - Active University MPSERS Member Statistics by Plan Type

Table 7 - University MPSERS Pensions in Force on September 30, 2018 by Type of Pension, Selected Option, and Pension Amount

Table 8 - Summary of MPSERS Liability Transfers Between Non-University and University from October 1, 2017 through September 30, 2018

Table 9 - Allocation of September 30, 2018 MPSERS Assets Between University and Non-University Members

Table 10 - Unfunded Actuarial Accrued Liability and Actuarial Gain (Loss)

Section 41a of Act 300 of the Public Acts of 1980, as amended, provides for "... the payment schedule for universities being based on and applied to the combined payrolls of the universities' employees who are members and who were hired before January 1, 1996 and the universities' employees who would have been members on or after January 1, 1996, but for the enactment of 1995 PA 272." The total additional payroll for University employees hired since January 1, 1996 was reported to be \$107.1 million for the year ending September 30, 2018. Table 3 converts the employer percentage of payroll contribution rate that is based on payroll *only* for University MPSERS members with future benefit accruals in the defined benefit plan (149.62% for the fiscal year beginning October 1, 2020) into a contribution rate (38.14% for the fiscal year beginning October 1, 2020) based on that payroll plus a percentage (31.62% for the fiscal year beginning October 1, 2020) based on the combined payroll of University employees hired since January 1, 1996 who are not members of MPSERS and of University MPSERS members who elected not to continue future benefit accruals in the defined benefit plan. Therefore, the 2020/2021 employer contribution should be the sum of:

- a) 38.14% of University MPSERS member payroll for those continuing in the defined benefit plan, plus
- b) 31.62% of University non-MPSERS member payroll and University MPSERS member payroll for those who elected the defined contribution plan.

Please note, the amortization component of the employer contribution as a percentage of payroll has been calculated consistently with previously issued University reports. This report does **NOT** reflect the following:

- The payroll floor associated with the enactment of Public Act 136 of 2016, or
- The normal cost or UAAL "floor" provisions of Public Act 92 of 2017 or Public Act 181 of 2018.

The amortization payment portion of the employer contribution in dollars for the fiscal year beginning October 1, 2020 (without regard for "floor" minimums) is \$55,415,921. The source of this payment, either from the Universities or from the State, does not impact valuation results.

The valuation was based upon information furnished by the Office of Retirement Services, concerning Retirement System benefits, financial transactions, and active members, terminated members, retirees and beneficiaries. Data was checked for internal and year-to-year consistency, but was not audited by us. This report may be provided to parties other than the Office of Retirement Services only in its entirety and only with the permission of the Office of Retirement Services. GRS is not responsible for unauthorized use of this report.



The valuation summarized in this report involves actuarial calculations that require making assumptions about future events. The assumptions and methods are disclosed fully in the September 30, 2018 actuarial valuation of MPSERS. 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. There may be cases where schedules do not add, or where they do not exactly balance to other related schedules due to rounding. The use of 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 of calculations to facilitate the modeling of future events. We may also exclude factors or data that we deem to be immaterial.

As noted in the September 30, 2018 actuarial valuation report of MPSERS, we continue to include two service purchase loads in the accrued liability due to questions from the auditor as to how purchased service is reported. We included a load of \$112,000 in the accrued liability for purchased service that has been paid for but not reported. We included a load of \$78,100 in the accrued liability for amounts included in the plan's reported assets for purchased service that has not yet been paid for by the members.

Assumptions and method changes, based on the adoption of the findings of the recently completed 5-year Experience Study (2012-2017) increased the computed liabilities and contribution requirements. The Experience Study assumptions increased the Actuarial Accrued Liability by \$55.9 million as of the valuation date. Additionally, in accordance with the Dedicated Gains Policy, the Non-Hybrid plan investment return assumption was lowered from 7.05% to 6.80% effective with this valuation. This assumption change increased the Accrued Accrued Liability by \$27.5 million.

To the best of our knowledge, this report is complete and accurate and 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 Gates are Members of the American Academy of Actuaries (MAAA), are independent of the plan sponsor, and 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, FCA, MAAA



Louise Gates, ASA, FCA, MAAA

MDD:bd



Table 1

**Demographic Characteristics
Comparison of University and Non-University MPSERS Members
as of September 30, 2018 and September 30, 2017**

2018	Total	University MPSERS Members	Non-University MPSERS Members
<u>Active Members</u>			
Number	182,930	1,061	181,869
Average age	46.4	57.4	46.3
Average service	13.1	27.1	13.0
Reported payroll	\$ 7,884,549,991	\$ 53,509,751	\$ 7,831,040,240
Average annual payroll	\$ 43,101	\$ 50,433	\$ 43,059
<u>Inactive Vested Members</u>			
Number	22,447	386	22,061
<u>Retirees & Beneficiaries</u>			
Number	216,618	5,013	211,605
Annual pension	\$ 4,967,054,783	\$ 86,727,750	\$ 4,880,327,033
Average annual pension	\$ 22,930	\$ 17,301	\$ 23,063
2017	Total	University MPSERS Members	Non-University MPSERS Members
<u>Active Members</u>			
Number	187,735	1,244	186,491
Average age	46.2	57.2	46.1
Average service	13.0	26.7	12.9
Reported payroll	\$ 7,880,040,886	\$ 62,264,282	\$ 7,817,776,604
Average annual payroll	\$ 41,974	\$ 50,052	\$ 41,920
<u>Inactive Vested Members</u>			
Number	22,234	399	21,835
<u>Retirees & Beneficiaries</u>			
Number	213,989	5,004	208,985
Annual pension	\$ 4,839,414,353	\$ 83,679,807	\$ 4,755,734,546
Average annual pension	\$ 22,615	\$ 16,723	\$ 22,756

The above statistics include only those members entitled to some type of defined benefit from the Retirement System. Active members hired after PA 300 of 2012 who elected the pure defined contribution plan are excluded from the statistics above.

The September 30, 2017 inactive counts include 4,230 people (including 36 University 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.

The September 30, 2018 inactive counts include 3,849 people (including 30 University 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.

Table 2

Contribution Rates for the Indicated Fiscal Years Expressed as a Percentage of Payroll

Total - All MPSERS Members			
Valuation Date	September 30, 2018	September 30, 2017	September 30, 2016
Fiscal Year Beginning	October 1, 2020	October 1, 2019	October 1, 2018
Total Normal Cost	10.79 %	10.62 %	9.19 %
Member Contributions	<u>4.85</u>	<u>4.94</u>	<u>4.73</u>
Employer Normal Cost	5.94 %	5.68 %	4.46 %
Amortization Payment	<u>26.70</u>	<u>24.07</u>	<u>24.01</u>
Total Employer Contribution	N/A	N/A	N/A
Projected Active Member Payroll			
For Fiscal Year (in millions)			
Normal Cost \$	\$7,777.1	\$8,726.9	\$8,761.3
Amortization \$	\$8,984.2	\$9,090.0	\$9,072.4
University MPSERS Members			
Valuation Date	September 30, 2018	September 30, 2017	September 30, 2016
Fiscal Year Beginning	October 1, 2020	October 1, 2019	October 1, 2018
Total Normal Cost	9.63 %	9.45 %	8.42 %
Member Contributions	<u>3.11</u>	<u>3.16</u>	<u>3.13</u>
Employer Normal Cost	6.52 %	6.29 %	5.29 %
Amortization Payment	<u>143.10</u>	<u>103.90</u>	<u>92.11</u>
Total Employer Contribution	149.62 %	110.19 %	97.40 %
Projected Active Member Payroll ⁽¹⁾			
For Fiscal Year (in millions)			
Normal Cost \$	\$38.7	\$45.0	\$51.0
Amortization \$	\$38.7	\$45.0	\$51.0
Non-University MPSERS Members			
Valuation Date	September 30, 2018	September 30, 2017	September 30, 2016
Fiscal Year Beginning	October 1, 2020	October 1, 2019	October 1, 2018
Total Normal Cost	10.80 %	10.63 %	9.19 %
Member Contributions	<u>4.86</u>	<u>4.95</u>	<u>4.74</u>
Employer Normal Cost	5.94 %	5.68 %	4.45 %
Amortization Payment	<u>26.20</u>	<u>23.67</u>	<u>23.63</u>
Total Employer Contribution	N/A	N/A	N/A
Projected Active Member Payroll ⁽²⁾			
For Fiscal Year (in millions)			
Normal Cost \$	\$7,738.4	\$8,681.9	\$8,710.3
Amortization \$	\$8,945.5	\$9,045.0	\$9,021.4

⁽¹⁾ Payroll for University members of MPSERS with future defined benefit accruals.

⁽²⁾ Payroll for Non-University members of MPSERS and University members of MPSERS with future defined contribution accruals.

Table 3

**University Contribution Rates as of September 30, 2018
for the Fiscal Year Beginning October 1, 2020
Expressed as a Percentage of Payroll and Estimated Dollars**

	Using Only Payroll of University Members of MPSERS with Future Defined Benefit Accruals		Also Using Payroll of University Non-Members Hired Since January 1, 1996 and University Members of MPSERS with Future Defined Contribution Accruals For Amortization Payment	
	Percentage of Pay	Dollar Amount (In Millions)	Percentage of Pay	Dollar Amount (In Millions)
Normal Cost	9.63 %	\$ 3.729	9.63 %	\$ 3.729
Member Contributions	<u>3.11</u>	<u>1.204</u>	<u>3.11</u>	<u>1.204</u>
Employer Normal Cost	6.52 %	\$ 2.525	6.52 %	\$ 2.525
Amortization Payment	<u>143.10</u>	<u>55.416</u>	<u>31.62</u>	<u>55.416</u>
Total Employer Contribution	149.62 %	\$ 57.941	38.14 %	\$ 57.941
Projected Payroll (In Millions)				
For Normal Cost		\$ 38.725		\$ 38.725
For Amortization Payment		\$ 38.725		\$ 175.250

This exhibit does not reflect the payroll floor associated with Public Act 136 of 2016 or the “floor” minimum provisions associated with Public Act 92 of 2017 or Public Act 181 of 2018 (see page 2).

Table 4
Actuarial Valuation Results
as of September 30, 2018

	Total All MPSERS Members	University MPSERS Members	Non-University MPSERS Members
(1) Fiscal Year Ending September 30,	2021	2021	2021
(2) Total Normal Cost of Benefits (as a % of member pay)	10.79%	9.63%	10.80%
(3) Member Contribution % (weighted average)	<u>4.85%</u>	<u>3.11%</u>	<u>4.86%</u>
(4) Employer Normal Cost % = (2) - (3)	5.94%	6.52%	5.94%
(5) Projected Active Member Payroll for Fiscal Year - Normal Cost \$	\$7,777,059,752	\$38,725,312	\$7,738,334,440
(6) Employer Normal Cost \$ = (4) x (5) ¹	461,373,811	2,524,890	458,848,921
(7) Actuarial Accrued Liability - Total	83,375,340,066	1,205,921,445	82,169,418,621
Active employees	24,016,573,726	250,764,574	23,765,809,152
Inactive vested members ²	2,413,539,210	27,065,650	2,386,473,560
Other inactive members ³	111,042,080	1,615,630	109,426,450
Retirees and surviving beneficiaries	56,834,185,050	926,475,591	55,907,709,459
(8) Funding Value of Assets	50,630,333,694	546,213,646	50,084,120,048
(9) Unfunded Actuarial Accrued Liabilities (UAAL) = (7) - (8)	32,745,006,372	659,707,799	32,085,298,573
(10) Amortization Period (years)	18	16	18
(11) Amortization Factor (level percent of payroll payments)	N/A	11.77243673	N/A
(12) Amortization Payment %	26.70%	143.10%	26.20%
(13) Projected Active Member Payroll for Fiscal Year - Amortization \$	\$8,984,201,569	\$38,725,312	\$8,945,476,257
(14) Amortization Payment \$ = (12) x (13)	2,398,781,820	55,415,921	2,343,365,899
(15) Total Computed Employer Contribution % = (4) + (12)	N/A	149.62%	N/A
(16) Total Computed Employer Contribution \$ = (6) + (14)	\$ 2,860,155,631	\$ 57,940,811	\$ 2,802,214,820

¹ The formula in line (6) only applies to the University column. This is because of the effect of the Pension Plus Plan and the Pension Plus 2 Plan provisions on the Total and Non-University columns.

² Includes pending refunds of employee contributions for former employees who terminated without a vested benefit.

³ Includes liabilities for employees who transferred to the DC pension plan in connection with PA 300.

Table 5

**Active University MPSERS Members as of September 30, 2018
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			
35 - 39	2	1						3	\$ 48,661	\$ 16,220
40 - 44	2	1	3	5	9			20	871,651	43,583
45 - 49	7	14	18	9	34	30	2	114	5,293,758	46,436
50 - 54	4	8	5	15	45	71	74	222	11,251,017	50,680
55 - 59	7	8	8	15	51	66	158	313	15,300,109	48,882
60 - 64	6	9	7	8	26	57	142	255	13,492,387	52,911
65 - 69	5	3	5	3	5	8	57	86	5,070,519	58,960
70 & Over	10	3	2	2	5	6	20	48	2,181,649	45,451
Total	43	47	48	57	175	238	453	1,061	\$ 53,509,751	\$ 50,433

The September 30, 2018 active statistics exclude 30 University 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.

As of September 30, 2018, the total University payroll (MPSERS members and Non-MPSERS members) was reported to be \$161.6 million.

Table 6

Active University MPSERS Member Statistics by Plan Type

	September 30, 2017	September 30, 2018
Basic Members		
Number	539	457
Average Age	58.2 years	58.5 years
Average Service	30.2 years	30.7 years
Reported Payroll	\$ 28,618,848	\$ 24,934,495
Average Annual Pay	\$ 53,096	\$ 54,561
MIP Members		
Number	705	604
Average Age	56.4 years	56.5 years
Average Service	24.0 years	24.3 years
Reported Payroll	\$ 33,645,434	\$ 28,575,256
Average Annual Pay	\$ 47,724	\$ 47,310
Total		
Number	1,244	1,061
Average Age	57.2 years	57.4 years
Average Service	26.7 years	27.1 years
Reported Payroll	\$ 62,264,282	\$ 53,509,751
Average Annual Pay	\$ 50,052	\$ 50,433

The September 30, 2017 total active count excludes 36 University 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.

The September 30, 2018 total active count excludes 30 University 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.

As of September 30, 2018, the total University payroll (MPSERS members and Non-MPSERS members) was reported to be \$161.6 million.

Table 7

University MPSERS Pensions in Force on September 30, 2018 by Type of Pension, Selected Option, and Pension Amount

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	327	265	56	1	3	0	2	149	103	48	7	20
201 - 400	515	407	65	5	31	0	7	257	136	76	12	34
401 - 600	515	399	60	5	35	0	16	228	145	77	16	49
601 - 800	465	362	48	5	35	0	15	220	112	72	15	46
801 - 1,000	456	392	27	4	27	0	6	223	88	73	23	49
1,001 - 1,200	412	342	42	1	19	0	8	174	91	86	29	32
1,201 - 1,400	349	309	25	1	11	0	3	146	91	66	29	17
1,401 - 1,600	337	299	27	1	4	0	6	136	81	64	25	31
1,601 - 1,800	267	238	20	0	4	0	5	109	58	57	24	19
1,801 - 2,000	210	189	18	0	1	0	2	81	52	39	17	21
Over 2,000	1,160	1,036	106	0	7	0	11	445	328	236	98	53
Totals	5,013	4,238	494	23	177	0	81	2,168	1,285	894	295	371

* 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 options

Table 8

Summary of MPSERS Liability Transfers Between Non-University & University from October 1, 2017 through September 30, 2018

Transfers between segments	
Transfers to University	
a) 3 Non-University actives as of 10/1/2017 who transferred to University actives by 10/1/2018	\$ 615,445
b) 0 Non-University terminated vested as of 10/1/2017 who transferred to University actives by 10/1/2018	0
c) 0 Non-University pensioners as of 10/1/2017 who transferred to University actives by 10/1/2018	0
d) 0 Non-University actives as of 10/1/2017 who transferred to University terminated vesteds by 10/1/2018	0
e) 1 Non-University terminated vesteds as of 10/1/2017 who transferred to University terminated vesteds by 10/1/2018	59,283
f) 0 Non-University pensioners as of 10/1/2017 who transferred to University terminated vesteds by 10/1/2018	0
g) 0 Non-University actives as of 10/1/2017 who transferred to University pensioners by 10/1/2018	0
h) 5 Non-University terminated vested as of 10/1/2017 who transferred to University pensioners by 10/1/2018	671,822
i) 3 Non-University pensioners as of 10/1/2017 who transferred to University pensioners by 10/1/2018	169,134
j) Total Transfers into University	\$ 1,515,684
Transfers from University	
k) 4 University actives as of 10/1/2017 who transferred to Non-University actives by 10/1/2018	\$ 730,813
l) 1 University terminated vesteds as of 10/1/2017 who transferred to Non-University actives by 10/1/2018	2,986
m) 0 University pensioners as of 10/1/2017 who transferred to Non-University actives by 10/1/2018	0
n) 0 University actives as of 10/1/2017 who transferred to Non-University terminated vesteds by 10/1/2018	0
o) 0 University terminated vested as of 10/1/2017 who transferred to Non-University terminated vesteds by 10/1/2018	0
p) 0 University pensioners as of 10/1/2017 who transferred to Non-University terminated vesteds by 10/1/2018	0
q) 0 University actives as of 10/1/2017 who transferred to Non-University pensioners by 10/1/2018	0
r) 0 University terminated vested as of 10/1/2017 who transferred to Non-University pensioners by 10/1/2018	0
s) 6 University pensioners as of 10/1/2017 who transferred to Non-University pensioners by 10/1/2018	293,096
t) Total Transfers from University	\$ 1,026,895
u) Total Net Transfers (j - t)	\$ 488,789

Table 9

Allocation of September 30, 2018 MPERS Assets Between University and Non-University Members

Year Ended September 30, 2018	Total MPERS	MPERS University	MPERS Non-University
A. Funding Value Beginning of Year	\$ 47,255,286,564	\$ 522,014,179	\$ 46,733,272,385
B. Market Value			
B1. Market Value End of Year	50,343,498,405	541,609,200	49,801,889,205
B2. Market Value Beginning of Year	47,011,783,071	518,815,498	46,492,967,573
B3. Audit Adjustment	-	-	-
C. Non-Investment Net Cash Flow			
C1. Member Contributions	393,059,173	1,920,391	391,138,782
C2. Employer Contributions	2,791,508,863	50,599,327 ³	2,740,909,536
C3. Benefit Payments	(4,934,638,368)	(85,848,406)	(4,848,789,962)
C4. Contribution Refunds / Transfers	(28,632,230)	-	(28,632,230)
C5. Administrative Expenses ¹	Included in D1	Included in D1	Included in D1
C6. University Employer Contribution Refund	-	-	-
C7. Other	503,855	-	503,855
C8. University/Non-University Participant Transfer	-	488,789	(488,789)
C9. Total Net Cash Flow: C1 + C2 + C3 + C4 + C5 + C6 + C7 + C8	(1,778,198,707)	(32,839,899)	(1,745,358,808)
D. Investment Return			
D1. Market Return Total: B1 - B2 - B3 - C9 ¹	5,109,914,041	55,633,601	5,054,280,440
D2. Assumed Rate of Return ²	N/A	7.05%	N/A
D3. Market Rate of Return	11.08%	11.08%	11.08%
D4. Dedicated Gains Policy Trigger (Excess Return %)	Multiple Triggers	3.57%	Multiple Triggers
D5. Market Return for Immediate Recognition: D4 x (B2 + B3 + (C9 - C8)/2)	1,646,325,701	17,926,796	1,628,398,905
D6. Assumed Amount of Return: D2 x (A + B3 + (C9 - C8)/2)	3,268,575,599	35,627,163	3,232,948,436
D7. Amount Subject to Phase-In: D1 - D5 - D6	195,012,741	2,079,642	192,933,099
E. Phased-In Recognition of Investment Return			
E1. Current Year: 0.20 x D7	39,002,548	415,928	38,586,620
E2. First Prior Year	14,177,192	146,315	14,030,877
E3. Second Prior Year	(25,962,780)	(224,653)	(25,738,127)
E4. Third Prior Year	(433,451,498)	(6,257,797)	(427,193,701)
E5. Fourth Prior Year	644,579,075	9,405,614	635,173,461
E6. Total Phase-Ins	238,344,537	3,485,407	234,859,130
F. Funding Value End of Year			
F1. Preliminary Funding Value End of Year: A + B3 + C9 + D5 + D6 + E6	\$ 50,630,333,694	\$ 546,213,646	\$ 50,084,120,048
F2. Corridor Percent	30%	30%	30%
F3. Upper Corridor Limit: (100% + F2) x B1	65,446,547,927	704,091,960	64,742,455,967
F4. Lower Corridor Limit: (100% - F2) x B1	35,240,448,883	379,126,440	34,861,322,443
F5. Funding Value End of Year	\$ 50,630,333,694	\$ 546,213,646	\$ 50,084,120,048
G. Difference Between Market and Funding Value	(286,835,289)	(4,604,446)	(282,230,843)
H. Recognized Rate of Return	11.11 %	11.29 %	11.11 %
I. Market Rate of Return	11.08 %	11.08 %	11.08 %
J. Ratio of Funding Value to Market Value	1.0057	1.0085	1.0057

¹ Allocated in proportion to average market value.

² Discount rate was 7.05% for the Non-Hybrid group, 7.00% for the Pension Plus Plan, and 6.00% for the Pension Plus 2 Plan for the September 30, 2017 valuation.

³ Includes non-member employer contributions.

Table 10

Unfunded Actuarial Accrued Liability and Actuarial Gain (Loss)

	Unfunded Actuarial Accrued Liability as of September 30, 2018		
	All MPSERS Members	University MPSERS Members	Non-University MPSERS Members
1. Actuarial accrued liability	\$83,375,340,066	\$1,205,921,445	\$82,169,418,621
2. Valuation assets	<u>50,630,333,694</u>	<u>546,213,646</u>	<u>50,084,120,048</u>
3. Unfunded (overfunded) actuarial accrued liability = (1) - (2)	32,745,006,372	659,707,799	32,085,298,573
	Derivation of Actuarial Gain (Loss)		
	All MPSERS Members	University MPSERS Members	Non-University MPSERS Members
4. Unfunded Actuarial Accrued Liability (UAAL) - Previous Valuation	\$ 29,438,189,224	\$ 606,103,317	\$ 28,832,085,907
5. Total Normal Cost (employer plus member) for Year Ending 9/30/2018	850,771,151	5,056,671	845,714,480
6. Total Contributions (employer plus member) for Year Ending 9/30/2018	3,184,568,036	52,519,718	3,132,048,318
7. Interest on:			
a. UAAL: Discount Rate ¹ x (4)	2,075,395,170	42,730,284	2,032,664,886
b. Normal Cost and Contributions: Discount Rate ¹ / 2 x [(5) - (6)]	<u>(82,247,205)</u>	<u>(1,673,072)</u>	<u>(80,574,133)</u>
c. Net Total: (a) + (b)	1,993,147,965	41,057,212	1,952,090,753
8. Change in UAAL due to Benefit Changes	0	0	0
9. Change in UAAL due to Assumption Changes	5,510,386,215	83,365,920	5,427,020,295
10. Expected UAAL Current Year: (4) + (5) - (6) + (7c) + (8) + (9)	34,607,926,519	683,063,402	33,924,863,117
11. Actual UAAL Current Year	32,745,006,372	659,707,799	32,085,298,573
12. Experience Gain/(Loss): (10) - (11)	1,862,920,147	23,355,603	1,839,564,544
13. Actuarial accrued liability at start of year	76,693,475,788	1,128,117,496	75,565,358,292
14. Gain (loss) as percent of pension actuarial accrued liabilities at start of year	2.43%	2.07%	2.43%
15. Portion of gain (loss) due to investment performance	1,884,670,238 ²	21,412,203 ²	1,863,258,035

¹ Discount rate was 7.05% for the Non-Hybrid group, 7.00% for the Pension Plus Plan, and 6.00% for the Pension Plus 2 Plan for the September 30, 2017 valuation.

² Please note that row 15 above includes the accelerated recognition of investment gains associated with the Dedicated Gains Policy, if applicable.