

February 3, 2015

CONFIDENTIAL

Ms. Judith Delaney  
Executive Assistant  
Missouri State Employees'  
Retirement System  
907 Wildwood Drive  
Jefferson City, MO 65109

**Re: House Bill No. 485 (HB 485)**

Dear Judy:

Enclosed are the results of a supplemental actuarial valuation related to a proposed benefit change for the Missouri State Employees' Retirement System June 30, 2014 valuation.

If you have any questions or comments, please contact us.

Respectfully submitted,



Brad Lee Armstrong, ASA, EA, FCA, MAAA



David T. Kausch, FSA, EA, FCA, MAAA

BLA/DTK:rmn  
Enclosure

**Missouri State Employees' Retirement System  
Supplemental Actuarial Valuation  
as of June 30, 2014**

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**REQUESTED BY:** Mr. Gary W. Findlay, Executive Director

**SUBMITTED BY:** Brad Lee Armstrong, ASA, EA, FCA, MAAA and David T. Kausch, FSA, EA, FCA, MAAA  
Gabriel, Roeder, Smith & Company

**DATE:** February 3, 2015

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This report presents results of a supplemental actuarial valuation to determine the effects of establishing a Hybrid Plan for all employees hired for the first time on or after January 1, 2016.

This report is intended to describe the financial effect of the proposed changes. No statement in this report is intended to be interpreted as a recommendation in favor of the changes, or in opposition to them. The date of the valuation was June 30, 2014. Brad Lee Armstrong and David T. Kausch are Members of the American Academy of Actuaries (MAAA) and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein.

If the scheduled contributions are made (subject to normal year-to-year experience fluctuations), then the System will be able to pay all benefits promised, when due. Our understanding is that the State is currently paying the appropriate total contribution rate.

Actuarial assumptions and methods were consistent with those used in the regular actuarial valuation of the Retirement System on the valuation date, unless otherwise noted. In particular:

- The assumed rate of interest was 8.0%.
- Payroll was assumed to increase 3% per year.
- For the regular valuation, the Unfunded Actuarial Accrued Liability is amortized over 30 years.
- The employer contribution rate shall not fall below 16.97% of payroll until the plan is 80% funded.

We believe the assumptions are internally consistent and reasonable, based on the actual experience of MOSERS. These actuarial assumptions and methods comply with current actuarial standards of practice.

The active group size is assumed to remain constant.

A brief summary of the data used in this valuation follows:

Valuation Group	Number	Payroll	Group Averages		
			Salary	Age(yrs.)	Service(yrs.)
General Assembly	191	\$ 6,871,658	\$ 35,977	51.6	4.5
Elected Officials	6	659,978	109,996	49.3	7.4
Total MOSERS	50,621	1,902,719,928	37,588	45.7	11.3

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Current MSEP 2011 Provisions:

**Regular State Employees:**

Benefit Formula:  $1.7\% \times \text{credited service} \times \text{Final Average Pay}$

Temporary benefit:  $0.8\% \times \text{service} \times \text{Final Average Pay}$  to age 62 (for those retiring under Rule of 90)

Normal Retirement Eligibility: Age 67 with 10 years of credited service or age 55 with age plus credited service equal to 90 or more.

Early Retirement Eligibility: Age 62 with 10 years of credited service, with normal retirement amount reduced by  $\frac{1}{2}\%$  for each month that retirement precedes eligibility for normal retirement. Normal retirement is age 67.

Vesting period: 10 years of service

COLA: 80% of increase in CPI (2% maximum)

**Members of the General Assembly:**

Benefit Formula:  $\frac{1}{24}$  of pay times years of credited service as a member of the General Assembly. The benefit is capped at 100% of pay.

Normal Retirement Eligibility: Age 62 and the completion of at least three full biennial assemblies or age 55 with age plus credited service equal to 90 or more.

COLA: 3.0%

**Elected Officials:**

Benefit Formula:  $\frac{1}{24}$  of pay times years of credited service as a statewide Elected Official. The benefit is capped at 50% of pay.

Normal Retirement Eligibility: Age 62 with 4 years of credited service or age 55 with age plus credited service equal to 90 or more.

COLA: 3.0%

**All Members:**

Employee Contribution: 4.0%

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Members hired on or after January 1, 2016 will be eligible to participate in a **Defined Benefit Plan** with the following provisions:

**Regular State Employees:**

Benefit Formula:  $1.0\% \times \text{credited service} \times \text{Final Average Pay}$

Temporary benefit:  $0.8\% \times \text{service} \times \text{Final Average Pay}$  to age 62 (for those retiring under Rule of 90)

Normal Retirement Eligibility: Age 67 with 10 years of credited service or age 55 with age plus credited service equal to 90 or more.

Early Retirement Eligibility: Age 62 with 10 years of credited service, with normal retirement amount reduced by  $\frac{1}{2}\%$  for each month that retirement precedes eligibility for normal retirement. Normal retirement is age 67.

Vesting period: **10 years** until the plan's actuary determines that the funded ratio of the most recent actuarial valuation is at least 90%, in which the vesting period will decrease to **5 years** for current and new members on January 1 of the following plan year.

**Members of the General Assembly:**

Benefit Formula:  $\frac{1}{48}$  of pay times years of credited service as a member of the General Assembly. The benefit is capped at 50% of pay.

Normal Retirement Eligibility: Age 62 and the completion of at least three full biennial assemblies or age 55 with age plus credited service equal to 90 or more.

**Elected Officials:**

Benefit Formula:  $\frac{1}{48}$  of pay times years of credited service as a statewide Elected Official. The benefit is capped at 25% of pay.

Normal Retirement Eligibility: Age 62 with 4 years of credited service or age 55 with age plus credited service equal to 90 or more.

**All Members:**

Employee Contribution: 4.0%

COLA: 80% of increase in CPI (2% maximum)

All members hired on or after January 1, 2016 will also participate in a **Defined Contribution Plan** with 3.0% employer contributions and 1.0% employee contributions.

The proposed removal of benefits for new hires has **no effect** on the MOSERS' current benefit obligation or current employer contributions for the active members currently covered under the Missouri State Employees' Retirement System plan.

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**Actuarial Statement**

	<u>Impact on MOSERS DB Employer Contributions</u>		
	<u>Present Benefits</u>	<u>Proposed Benefits</u>	<u>Increase/ (Decrease)</u>
<b>FY 2015-16 Contribution</b>			
Total Normal Cost	8.21 %	7.97 %	(0.24) %
Member Contribution Rate	(1.32)	(1.32)	0.00
UAAL%	10.08	10.32	0.24 *
Total Employer Contribution Rate	<u>16.97 %</u>	<u>16.97 %</u>	<u>0.00 %</u>
Employer Normal Cost (\$ millions)	\$ 139.1	\$ 134.2	\$ (4.9)
Estimated Employer Contribution (\$ millions)	\$ 342.6	\$ 342.6	\$ 0.0
<b>Valuation Results as of June 30, 2014 (\$ millions)</b>			
Market Value of Assets (MVA)	\$ 9,136.8	\$ 9,136.8	\$ -
Actuarial Accrued Liability (AAL)	11,494.6	11,494.6	-
Actuarial Value of Assets (AVA)	8,637.8	8,637.8	-
Unfunded Actuarial Accrued Liability (UAAL)	<u>\$ 2,856.8</u>	<u>\$ 2,856.8</u>	<u>\$ -</u>
Percent Funded	75.1 %	75.1 %	0.0 %

\* The decrease in normal cost is offset by a commensurate increase in the UAAL% due to the minimum funding policy.

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**Projected Change in Annual Employer Contributions  
(In Thousands)**

Fiscal Year	Current Provisions (Beginning of Year)				Proposed Provisions (Beginning of Year)				Projected DB Employer Contributions						Projected DC Employer Contributions		Total Projected (DB +DC) Employer Contributions	
	Projected AAL	Projected AVA	Funded Ratio	Projected MVA	Projected AAL	Projected AVA	Funded Ratio	Projected MVA	Current		Est. Impact		Proposed		Proposed		Proposed	
									Rate	Dollars	Rate#	Dollars	Rate	Dollars	Rate@	Dollars	Rate	Dollars
2015	\$11,494,572	\$ 8,637,759	75.1%	\$ 9,136,782	\$11,494,572	\$ 8,637,759	75.1%	\$9,136,782	16.97%	\$ 332,578	0.00%	\$ -	16.97%	\$ 332,578	0.03%	\$ 636	17.00%	\$ 333,215
2016	11,876,237	8,990,806	75.7%	9,090,149	11,873,927	8,990,806	75.7%	9,090,149	16.97%	342,556	0.00%	-	16.97%	342,556	0.20%	4,136	17.17%	346,691
2017	12,233,084	9,327,067	76.2%	9,420,891	12,223,417	9,327,067	76.3%	9,420,891	16.97%	352,832	0.00%	-	16.97%	352,832	0.49%	10,143	17.46%	362,975
2018	12,560,849	9,644,211	76.8%	9,720,317	12,538,917	9,644,211	76.9%	9,720,317	16.97%	363,417	0.00%	-	16.97%	363,417	0.72%	15,497	17.69%	378,915
2019	12,862,399	9,945,896	77.3%	10,005,964	12,823,225	9,945,896	77.6%	10,005,964	16.97%	374,320	0.00%	-	16.97%	374,320	0.93%	20,458	17.90%	394,778
2020	13,140,057	10,235,495	77.9%	10,278,294	13,078,480	10,235,495	78.3%	10,278,291	16.97%	385,549	0.00%	-	16.97%	385,549	1.11%	25,166	18.08%	410,716
2021	13,397,164	10,517,466	78.5%	10,544,058	13,307,748	10,517,467	79.0%	10,544,030	16.97%	397,116	0.00%	-	16.97%	397,116	1.27%	29,710	18.24%	426,826
2022	13,636,940	10,796,235	79.2%	10,812,792	13,513,883	10,796,253	79.9%	10,812,732	16.97%	409,029	0.00%	-	16.97%	409,029	1.42%	34,173	18.39%	443,203
2023	13,859,832	11,073,607	79.9%	11,083,725	13,696,899	11,073,682	80.8%	11,083,669	16.97%	421,300	(5.93%)	(147,219)	11.04%	274,081	1.56%	38,614	12.60%	312,695
2024	14,064,648	11,349,903	80.7%	11,352,325	13,855,132	11,350,105	81.9%	11,352,337	12.62%	322,706	(1.86%)	(47,562)	10.76%	275,144	1.68%	43,044	12.44%	318,187
2025	14,250,907	11,626,241	81.6%	11,619,676	13,987,589	11,478,370	82.1%	11,479,908	12.47%	328,436	(1.95%)	(51,359)	10.52%	277,077	1.80%	47,464	12.32%	324,541
2026	14,418,820	11,792,854	81.8%	11,790,419	14,094,074	11,585,814	82.2%	11,576,710										

# The ultimate impact on the normal cost is a decrease of 2.32 % of projected payroll. Due to the minimum funding policy, the UAAL offsets the change in normal cost until the year after the system reaches 80% funded.  
 @ The ultimate DC contribution is 3.0% of projected payroll.

Fiscal Year	Valuation		
	Payroll Projected	Pre 1/1/2016 Payroll*	Post 1/1/2016 Payroll
2015	\$ 1,902,720	\$ 1,902,720	\$ -
2016	1,959,802	1,938,588	21,213
2017	2,018,596	1,880,742	137,854
2018	2,079,153	1,741,050	338,104
2019	2,141,528	1,624,953	516,575
2020	2,205,774	1,523,845	681,929
2021	2,271,947	1,433,076	838,871
2022	2,340,106	1,349,764	990,342
2023	2,410,309	1,271,195	1,139,113
2024	2,482,618	1,195,490	1,287,128
2025	2,557,096	1,122,305	1,434,791
2026	2,633,809	1,051,661	1,582,148

\* DB, DC and Total Contribution Rates are based on open group payroll.

Numbers may not add due to rounding.

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**Comment A:** The long-term effect of the proposed Hybrid Plan is an increase in total employer contribution of 0.68% of total MOSERS' payroll. The components of this long-term increase are as follows:

<b>Components of Changes in Long-Term Total Employer Contribution Rate (as a percent of payroll)</b>	
A. Change in total DB Normal Cost	(2.32)%
B. Change in DB member contribution rate	0.00%
C. Change in employer DB Normal Cost (A. - B.)	(2.32)%
D. Change in employer DC contribution rate	3.00%
<b>E. Total change in employer contribution rate (C. + D.)</b>	<b>0.68%</b>

These increases would emerge over time as new employees replace the existing workforce. For purposes of this supplemental valuation, the change in the DB employer contribution rate is reflected beginning July 1, 2016, since the employer contribution rate for the year ending June 30, 2015 has already been certified by the Board of Trustees. The change in DC employer contribution rate is reflected beginning January 1, 2016. Since the DB plan remains open in the hybrid plan, there is no change in the amortization of the Unfunded Accrued Liability contributions.

**Comment B:** The cost of the 5-year vesting is not shown in the projection due to not achieving 90% funded status. The long term effect of this change is highly dependent on the assumptions and demographics in place at implementation, both of which may materially change in the future.

**Comment C:** The proposal does not specify vesting of the 3% employer defined contribution rate nor does it discuss the treatment of forfeitures for non-vested employer DC contributions. For purposes of this supplemental valuation, we have assumed that the DC vesting will be immediate and therefore there will be no forfeitures.

**Comment D:** Capping the COLA at 2% may result in an average COLA slightly less than 2%. For the purposes of this report, a 1.5% COLA assumption was used. The COLA assumption represents the expectation of a lognormal distribution truncated at 2%.

**Comment E:** At the September 17, 2014 Board meeting, the Board adopted a minimum funding policy such that the employer contribution rate will be no less than 16.97% of payroll (the rate calculated in the June 30, 2013 valuation) until such a time as the plan is at least 80% funded on an actuarial value of assets basis. Additionally, any benefit increase will result in a commensurate increase in the minimum contribution rate of 16.97%. This supplemental valuation reflects the 16.97% minimum contribution rate until the plan is 80% funded. Since the proposed change is not an increase in System benefits, the rate of 16.97% is unchanged by the proposal.

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**Comment F:** The calculations are based upon assumptions regarding future events, which may or may not materialize. They are also based upon present and proposed assumptions that are outlined in the report. If you have reason to believe that the assumptions that were used are unreasonable, that the plan provisions are incorrectly described, that important plan provisions relevant to this proposal are not described, or that conditions have changed since the calculations were made, you should contact the authors of this report prior to relying on information in the report.

**Comment G:** If you have reason to believe that the information provided in this report is inaccurate, or is in any way incomplete, or if you need further information in order to make an informed decision on the subject matter of this report, please contact the authors of the report prior to making such decision.

**Comment H:** In the event that more than one plan change is being considered, it is very important to remember that the results of separate actuarial valuations cannot generally be added together to produce a correct estimate of the combined effect of all of the changes. The total can be considerably greater than the sum of the parts due to the interaction of various plan provisions with each other, and with the assumptions that must be used.

**Comment I:** This report is intended to describe the financial effect of the proposed plan changes on the Retirement System. Except as otherwise noted, potential effects on other benefit plans were not considered.

**Comment J:** The reader of this report should keep in mind that actuarial calculations are mathematical estimates based on current data and assumptions about future events (which may or may not materialize). Please note that actuarial calculations can and do vary from one valuation year to the next. As a result, the cost impact of a benefit change may fluctuate over time, as the demographics of the group changes.



**Summary of Assumptions Used**  
**for the June 30, 2014 Actuarial Valuation**

-----**Economic Assumptions**-----

The economic assumptions were adopted by the Board on July 19, 2012 to be first effective for the June 30, 2012 valuation.

**The investment return rate** used in the valuations was 8.0% per year, compounded annually (net after investment expenses). This assumption is used to account for the fact that equal amounts of money payable at different points in time in the future do not have the same value presently.

**Pay increase assumptions** for individual active members are shown for sample ages on page 10. Part of the assumption for each age is for merit and/or seniority increase, and the other 3.0% recognizes wage inflation. This assumption is used to project a member's current salary to the salaries upon which benefits will be based.

**The active member payroll** is assumed to increase 3.0% annually, which is the portion of the individual pay increase assumptions attributable to wage inflation.

**The annual Cost-of-Living Adjustment (COLA)** is assumed to be 4.00%, on a compounded basis, when a minimum COLA of 4% is in effect (4.0% for 12 years, 3.06% the next year to reach a cumulative 65% followed by 2.0%). When no minimum COLA is in effect, price inflation is assumed to be 2.5% and the annual COLA is assumed to be 2.0% (80% of 2.5%), on a compounded basis.

-----**Non-Economic Assumptions**-----

The demographic assumptions were adopted by the Board on June 20, 2012 to be first effective for the June 30, 2012 valuation.

**The mortality table**, for post-retirement mortality, used in evaluating allowances to be paid was the RP 2000 combined healthy mortality table, projected to 2016 with Scale AA. Related values are shown on page 11. This assumption is used to measure the probabilities of each benefit payment being made after retirement. The pre-retirement mortality rates used were 100% of the post-retirement mortality rates for males and 80% of the post-retirement mortality for females.

The mortality tables include a margin of 15% for men and 17% for women for mortality improvements based on the four-year experience study from June 30, 2007 to June 30, 2011.

## **Summary of Assumptions Used for the June 30, 2014 Actuarial Valuation**

*The probabilities of age and service retirement* are shown on page 12. It was assumed that each member will be granted one half year (4 months for 2011 plan members) of service credit for unused leave upon retirement and military service purchases.

*The probabilities of withdrawal from service, disability and death-in-service* are shown for sample ages on page 10. For disability retirement, impaired longevity was recognized by use of special mortality tables.

*The entry age normal actuarial cost method of valuation* was used in determining liabilities and normal cost. Each member's normal cost was based on the benefit provisions applicable to that member. The normal cost is projected to the applicable fiscal year. Differences in the past between assumed experience and actuarial experience ("actuarial gains and losses") become part of actuarial accrued liabilities. Unfunded actuarial accrued liabilities are amortized to produce payments, (principal & interest) which are level percents of payroll contributions.

*The amortization of the unfunded actuarial accrued liability is based on a closed 30-year amortization period, level percent-of-payroll amortization. This method was first effective with the June 30, 2014 valuation. The amortization is based on the projected unfunded actuarial accrued liability to the beginning of the fiscal year during which the contributions are expected to be made.*

*Employer contribution dollars* were assumed to be *paid in equal installments* throughout the employer's fiscal year.

*Actuarial value of assets.* Valuation assets recognize assumed investment return fully each year. Differences between actual and assumed investment return are phased-in over an open three-year period. Valuation assets are not permitted to deviate from the market value by less than 80% or more than 125%.

*The data about persons now covered and about present assets* were furnished by the System's administrative staff. Although examined for general reasonableness, the data was not audited by the Actuary.

*The liabilities for active members hired on or after January 1, 2011 were based on MSEP 2011 benefits. The liabilities for active members hired on or after July 1, 2000 (April 26, 2005 for administrative law judges) were based on MSEP 2000 benefits. The liabilities for active members hired before July 1, 2000 for Elected Officials, General Assembly, and Uniformed Water Patrol were based on MSEP benefits. The liabilities for all other active members hired before July 1, 2000 were based on the assumption that members would elect MSEP 2000 prior to age 62 and MSEP on or after age 62.*

*For members on long-term disability, the actuarial accrued liability is the present value of benefits under active assumptions plus the difference of the present value of benefits with and without future pay growth to reflect indexing of pay in ultimate retirement benefits.*

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The actuarial valuation computations were made by or under the supervision of Brad Lee Armstrong and David T. Kausch who are Members of the American Academy of Actuaries (MAAA).

## Separations from Active Employment before Service Retirement and Individual Pay Increase Assumptions as of June 30, 2014

Sample Ages	Years of Service	Percent of Active Members ----- Separating within the Next Year -----						Pay Increase Assumptions -- For An Individual Employee --		
		Withdrawal ***		Death*		Disability		Merit & Seniority**	Base (Economy)	Increase Next Year
		Men	Women	Men	Women	Men	Women			
	0	23.0 %	26.9 %							
	1	18.0	20.5							
	2	15.0	15.4							
	3	13.0	12.5							
	4	11.0	10.9							
25	5+	13.0	13.3	0.03 %	0.01 %	0.17 %	0.30 %	2.9 %	3.0 %	5.9 %
30		10.2	10.5	0.04	0.02	0.17	0.30	2.2	3.0	5.2
35		7.9	8.1	0.07	0.03	0.21	0.30	1.6	3.0	4.6
40		5.6	5.7	0.09	0.04	0.26	0.32	1.2	3.0	4.2
45		4.2	4.3	0.12	0.07	0.34	0.38	0.9	3.0	3.9
50		2.8	2.9	0.16	0.10	0.49	0.57	0.7	3.0	3.7
55		2.8	2.9	0.27	0.19	1.07	0.89	0.5	3.0	3.5
60		2.8	2.9	0.52	0.37	1.50	1.50	0.4	3.0	3.4
65		2.8	2.9	1.02	0.72	1.60	1.70	0.3	3.0	3.3
70		2.8	2.9	1.74	1.24	1.60	1.70	0.2	3.0	3.2

\* 2% of the deaths in active service are assumed to be duty related.

\*\* Does not apply to members of the General Assembly.

\*\*\* Does not apply to Elected Officials and Legislators.

### Elected Officials and Legislators

Percent of Active Members Separating within the Next Year	
Years of Service	Withdrawal Male/Female
1	8.0 %
2	8.0
3	8.0
4	8.0
5	12.0
6	12.0
7	12.0
8+	35.0

## Post-Retirement Mortality Rates

*The mortality tables* were the RP 2000 mortality table, projected to 2016 with Scale AA, including a margin of 15% for men and 17% for women for mortality improvements. Disabled mortality tables are the healthy mortality tables set forward 10 years. The pre-retirement mortality rates used were 100% of the post-retirement mortality rates for males and 80% of the post-retirement mortality for females.

Age	Service		Disability	
	Men	Women	Men	Women
45	0.0012	0.0009	0.0027	0.0024
50	0.0016	0.0013	0.0052	0.0047
55	0.0027	0.0024	0.0102	0.0090
60	0.0052	0.0047	0.0174	0.0155
65	0.0102	0.0090	0.0302	0.0247
70	0.0174	0.0155	0.0548	0.0410
75	0.0302	0.0247	0.0990	0.0703
80	0.0548	0.0410	0.1720	0.1255
85	0.0990	0.0703	0.2591	0.1884

## Retirement Values June 30, 2014

Sample Attained Ages	Present Value of \$1/Month the First Year (with 50% Joint & Survivor) Increasing 4.0% / 2.0% Yearly				Present Value of \$1/Month the First Year Increasing 2.0% Yearly			
	Service		Disability		Service		Disability	
	Men	Women	Men	Women	Men	Women	Men	Women
40	\$224.11	\$224.12	\$212.76	\$211.89	\$184.40	\$186.75	\$169.01	\$172.32
45	217.22	217.01	202.65	201.39	177.68	180.43	157.94	162.08
50	208.28	207.81	190.14	188.39	169.01	172.32	144.49	149.76
55	196.76	196.07	175.18	172.83	157.94	162.08	128.94	135.56
60	182.48	181.61	157.88	154.80	144.49	149.76	111.76	119.87
65	165.46	164.49	138.11	134.44	128.94	135.56	92.72	102.82
70	145.94	144.91	116.94	112.03	111.76	119.87	73.10	84.62
75	123.90	123.17	96.04	88.83	92.72	102.82	55.15	66.19
80	100.55	100.10	76.52	68.15	73.10	84.62	40.28	50.49
85	78.09	77.41	59.89	52.82	55.15	66.19	30.32	40.10

Sample Attained Ages	Future Life Expectancy (Years)			
	Service		Disability	
	Men	Women	Men	Women
40	41.95	44.10	32.39	34.43
45	37.15	39.24	27.68	29.69
50	32.39	34.43	23.13	25.13
55	27.68	29.69	18.87	20.84
60	23.13	25.13	14.96	16.90
65	18.87	20.84	11.39	13.32
70	14.96	16.90	8.29	10.12
75	11.39	13.32	5.83	7.37
80	8.29	10.12	4.03	5.31
85	5.83	7.37	2.91	4.05

## Percent of Eligible Active Members Retiring Next Year

Normal Retirement Pattern					Early Retirement Pattern		
Retirement Age	MSEP and MSEP 2000*			MSEP 2011**	Retirement Age	MSEP and MSEP 2000*	MSEP 2011**
	Percent Eligible			Percent Eligible		Percent Eligible	Percent Eligible
	1 <sup>st</sup> Year	2 <sup>nd</sup> Year	3 <sup>rd</sup> Year				
48	22%						
49	22	10%					
50	22	10	21%				
51	22	10	21				
52	22	10	21				
53	22	10	18				
54	22	10	18				
55	22	12	26	45%			
56	22	12	25	45			
57	22	12	22	35	57	2.5%	
58	22	12	22	35	58	3.5	
59	22	12	20	30	59	3.5	
60	21	12	22	35	60	5.0	
61	20	12	20	25	61	6.0	
62	19	22	30	40	62	6.0	10%
63	15	18	25	30	63	6.0	10
64	15	20	17	20	64	6.0	10
65	20	20	27	30	65	6.0	50
66	22	20	26	25	66	6.0	50
67	15	25	22	20	67	6.0	
68	15	20	22	20	68	6.0	
69	15	20	22	20	69	6.0	
70	25	20	22	20	70	6.0	
71	25	20	22	20	71	6.0	
72	25	20	22	20	72	6.0	
73	25	20	22	20	73	6.0	
74	25	20	22	20	74	6.0	
75	50	50	22	50	75	6.0	
76	50	50	22	50	76	6.0	
77	75	75	22	75	77	6.0	
78	100	100	100	100	78	100.0	

\* For members hired prior to January 1, 2011.

\*\* For members hired on or after January 1, 2011.

February 20, 2015

Ms. Pam Henry  
Assistant Executive Director  
Missouri Department of Transportation and  
Highway Patrol Employees' Retirement System (MPERS)  
1913 William Street  
Jefferson City, Missouri 65109

**Re: Supplemental Valuation – HB 485 Proposed Change to RSMo 104  
Relating to Creating a Hybrid Plan**

Dear Pam:

Enclosed are the results of a supplemental actuarial valuation to measure the financial effects of creating a Hybrid Plan for new hires, as requested.

Respectfully submitted,



Kenneth G. Alberts

KGA:clh  
Enclosure

cc: Scott Simon, Executive Director  
Heidi Barry (GRS)

**MPERS**  
**Supplemental Actuarial Valuation**  
**as of June 30, 2014**

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**REQUESTED BY:** Ms. Pam Henry, Assistant Executive Director  
Missouri Department of Transportation and  
Highway Patrol Employees' Retirement System

**DATE:** February 20, 2015

**SUBMITTED BY:** Kenneth G. Alberts and Heidi Barry, ASA, MAAA  
Gabriel, Roeder, Smith & Company

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This report contains the results of a supplemental actuarial valuation of a proposed change to RSMo 104 which would create a Hybrid Plan for new hires, as requested by MPERS.

This report may be shared with other parties, but only in its entirety and only with the permission of MPERS.

Supplemental valuations do not predict the result of future actuarial valuations. (Future activities can affect future valuation results in an unpredictable manner.) Rather, supplemental valuations give an indication of the probable effect of the **change only** on future valuations without comment on the complete end result of the future valuations.

Heidi Barry is a Member of the American Academy of Actuaries (MAAA) and meets the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein.

The valuation was based upon data furnished by MPERS for the June 30, 2014 actuarial valuation. Actuarial methods and assumptions, except where otherwise noted, were the same as those used in the last regular annual actuarial valuation as of June 30, 2014. In particular:

- The assumed rate of interest was 7.75%.
- The valuation method was the entry-age actuarial cost method.
- The amortization period was 10 years for unfunded retiree liabilities and 25 years for unfunded active liability; amortizations were calculated assuming payroll would increase 3.50% per year before the changes.
- Price inflation is assumed to be 3.00% per year.

A brief summary of the data used in this valuation is presented on the next page.

**MPERS**  
**Supplemental Actuarial Valuation**  
**as of June 30, 2014**

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<b>Group</b>	<b>Number</b>	<b>Covered Payroll/ Annual Benefits</b>	<b>Average in Years</b>	
			<b>Age</b>	<b>Service</b>
MoDOT Employees	5,026	\$211,776,834	45.0	13.6
Civilian Patrol Employees	1,127	43,858,728	44.8	12.4
Uniformed Patrol	1,237	76,450,127	39.9	14.5
<b>Total</b>	<b>7,390</b>	<b>\$332,085,689</b>	<b>44.1</b>	<b>13.6</b>
 Retirees and Beneficiaries	 8,401	 \$217,149,528	 70.3	 N/A

**Term Vested**

**Number**

2,212



# MPERS

## Supplemental Actuarial Valuation as of June 30, 2014

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### Proposed Provisions

Establish a Hybrid Plan for any person who is hired for the first time as a non-uniformed MoDOT or civilian patrol state employee on or after January 1, 2016. For the Defined Contribution component, the member contribution rate would be 1.0% of payroll and the employer contribution rate would be 3.0% of payroll. Provisions for the Defined Benefit component of the Hybrid Plan would be similar to the current 2011 Tier Defined Benefit provisions, with the following exceptions:

- The benefit multiplier for the life annuity will be 1% instead of 1.7%.
- Annual post retirement cost-of-living increases will be capped at 2% of current benefit instead of 5%.
- Normal retirement eligibility at age 67 with 5 years of service once the System becomes 90% funded.
- Vesting is reduced to 5 years from 10 years once the System becomes 90% funded.
- Early retirement eligibility at age 62 with 5 years of service instead of age 62 with 10 years of service once the System becomes 90% funded.
- A defined contribution benefit is added to the defined benefit and is based on 1% member contributions, 3% employer contributions plus accumulated interest.

### Discussion

Benefits payable under the Closed Plan and the Y2K Plan for members first hired prior to January 1, 2016 are not affected by the proposal; therefore, there is no immediate change in the employer contribution rates. The long-term employer contribution for the 2011 Tier (the current open plan provisions) is 6.74% of pay for non-uniformed members. The estimated long-term employer contributions for the proposed Hybrid plan are 5.75% of pay for non-uniformed members (including the DB and DC components) under the 10-year vesting/eligibility structure, and 5.61% under the 5-year vesting/eligibility structure (upon MPERS reaching a funding level of at least 90%). This represents a decrease over the 2011 Tier benefits for non-uniformed members of approximately 0.99% and 1.13% of pay, respectively.

It is important to note that most MPERS members are currently covered by older plans/tiers. The average long-term cost of benefits for the current members (based on their current benefits) is 12.46% of pay for non-uniformed members. The proposed plan represents a decrease in long-term employer costs over the average current level of approximately 6.71% of pay to 6.85% of pay. As discussed above, most of this decrease is attributable to the 2011 Tier. Changes in the employer contribution will evolve as new hires enter the plan.

Please see the comments on pages 6 and 7, and the projections on page 5 for more information.

**MPERS**  
**Supplemental Actuarial Valuation**  
**as of June 30, 2014**

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**Actuarial Statement**

	<b><u>Impact on MPERS DB Employer Contributions</u></b>		
	<b><u>Present</u></b>	<b><u>Proposed</u></b>	<b><u>Increase /</u></b>
	<b><u>Benefits</u></b>	<b><u>Benefits<sup>#</sup></u></b>	<b><u>(Decrease)</u></b>
<b>FY 2017-18 Contribution</b>			
Total Normal Cost	14.01 %	13.80 %	(0.21) %
Member Contribution Rate	(0.80)	(0.80)	0.00
UAAL%	40.08	40.08	0.00
Total Employer Contribution Rate	<u>53.29 %</u>	<u>53.08 %</u>	<u>(0.21) %</u>
Employer Normal Cost (\$ millions)	\$ 50.3	\$ 49.5	\$ (0.8)
Estimated Employer Contribution (\$ millions)	\$ 203.1	\$ 202.3	\$ (0.8)
<b>Valuation Results as of June 30, 2014 (\$ millions)</b>			
Market Value of Assets (MVA)	\$ 1,937.3	\$ 1,937.3	\$ -
Actuarial Accrued Liability (AAL)	3,650.2	3,650.2	-
Actuarial Value of Assets (AVA)	<u>1,795.3</u>	<u>1,795.3</u>	<u>-</u>
Unfunded Actuarial Accrued Liability (UAAL)	\$ 1,854.9	\$ 1,854.9	\$ -
Percent Funded	49.2 %	49.2 %	0.00

# Prior to any potential changes to rate stabilization reserve (see Comment 9).

Employer contributions for FYXX are determined from the 6/30/XX-2 valuation. Since the 6/30/2016 valuation will be the first valuation to include members covered under the proposed plan, the FY 2018 Employer Contribution will be the first to be affected (and is the one shown above).

# MPERS

## Supplemental Actuarial Valuation as of June 30, 2014

Fiscal Year	Current Provisions (Beginning of Year)				Proposed Provisions (Beginning of Year)				Projected DB Employer Contributions						Projected DC Employer Contributions		Total Projected (DB +DC) Employer Contributions	
	Projected AAL	Projected AVA	Funde Ratio	Projected MVA	Projected AAL	Projected AVA	Funde Ratio	Projected MVA	Current		Est. Impact		Proposed		Proposed		Proposed	
	Rate	Dollars	Rate	Dollars	Rate	Dollars	Rate	Dollars	Rate	Dollars	Rate	Dollars	Rate	Dollars	Rate@	Dollars	Rate	Dollars
2015	\$ 3,650,242	\$ 1,795,264	49.2%	\$ 1,937,269	\$ 3,650,242	\$ 1,795,264	49.2%	\$1,937,269	58.00%	\$ 206,328	0.00%	\$ -	58.00%	\$ 206,328	0.06%	\$ 213	58.06%	\$ 206,542
2016	3,725,697	1,974,208	53.0%	2,040,391	3,725,697	1,974,208	53.0%	2,040,391	55.39%	203,940	0.00%	-	55.39%	203,940	0.24%	884	55.63%	204,824
2017	3,795,082	2,136,931	56.3%	2,144,019	3,795,082	2,136,931	56.3%	2,144,019	53.29%	203,075	(0.21%)	(800)	53.08%	202,275	0.36%	1,372	53.44%	203,647
2018	3,857,122	2,238,003	58.0%	2,240,079	3,856,320	2,238,003	58.0%	2,240,079	52.74%	208,014	(0.43%)	(1,696)	52.31%	206,318	0.48%	1,893	52.79%	208,211
2019	3,910,592	2,328,615	59.5%	2,328,905	3,908,105	2,327,784	59.6%	2,328,074	52.28%	213,416	(0.64%)	(2,613)	51.64%	210,804	0.60%	2,449	52.24%	213,253
2020	3,954,054	2,415,197	61.1%	2,415,265	3,948,917	2,412,539	61.1%	2,412,608	51.87%	219,154	(0.85%)	(3,591)	51.02%	215,562	0.72%	3,042	51.74%	218,604
2021	3,986,001	2,498,705	62.7%	2,498,716	3,977,160	2,493,128	62.7%	2,493,139	51.45%	224,987	(1.04%)	(4,548)	50.41%	220,440	0.84%	3,673	51.25%	224,113
2022	4,004,687	2,578,605	64.4%	2,578,607	3,990,994	2,568,865	64.4%	2,568,867	51.04%	231,006	(1.22%)	(5,522)	49.82%	225,485	0.96%	4,345	50.78%	229,830
2023	4,008,272	2,653,950	66.2%	2,653,951	3,988,523	2,638,731	66.2%	2,638,732	50.61%	237,077	(1.38%)	(6,464)	49.23%	230,613	1.08%	5,059	50.31%	235,672
2024	3,994,685	2,723,731	68.2%	2,723,731	3,967,531	2,701,597	68.1%	2,701,597	50.18%	243,290	(1.54%)	(7,466)	48.64%	235,824	1.20%	5,818	49.84%	241,642
2025	3,961,600	2,786,673	70.3%	2,786,673	3,925,629	2,756,109	70.2%	2,756,109	49.73%	249,547	(1.68%)	(8,430)	48.05%	241,117	1.32%	6,624	49.37%	247,741
2026	3,906,554	2,841,448	72.7%	2,841,448	3,860,245	2,800,760	72.6%	2,800,760										

@ The ultimate DC contribution is 3.0% of projected payroll.

Fiscal Year	EOY Valuation		
	Payroll Projected	Pre 1/1/2016 Payroll*	Post 1/1/2016 Payroll
	2015	\$ 343,709	\$ 343,709
2016	355,738	348,623	7,115
2017	368,189	338,734	29,455
2018	381,076	335,347	45,729
2019	394,414	331,308	63,106
2020	408,218	326,574	81,644
2021	422,506	321,105	101,401
2022	437,293	314,851	122,442
2023	452,599	307,767	144,832
2024	468,440	299,802	168,638
2025	484,835	290,901	193,934
2026	501,804	281,010	220,794

Projection results are before applying any changes to the contribution stabilization reserve for FY 17 and later DB contribution rates. Projections assume all members hired after January 1, 2016 are new hires (not re-hires) and are covered by the new hybrid plan.

\* DB, DC and Total Contribution Rates are based on open group payroll.

Numbers may not add due to rounding.

# MPERS

## Supplemental Actuarial Valuation as of June 30, 2014

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### Comments

**Comment 1:** For purposes of this supplemental valuation, the change in the DB employer contribution rate is reflected beginning July 1, 2015. The change in DC employer contribution rate is reflected beginning January 1, 2016. Since the DB plan remains open in the hybrid plan, there is no change in the amortization of the Unfunded Accrued Liability contributions.

**Comment 2:** The proposed plan does not indicate if the DC account can be annuitized by the plan for members covered by the Hybrid plan. If such an option is allowed, cost estimates could be different than contained herein, depending on how account balances are annuitized.

**Comment 3:** The long-term cost of the proposed plan was estimated by modeling what the entry-age normal cost would be if all current MPERS members were covered by the proposed provisions. Additional cost for expenses and disability insurance premiums were assumed not to change as a result of the proposed plan changes. Implementation of the DC plan may result in additional administrative expenses.

**Comment 4:** The simplified projections on page 5 show the possible total contributions in each of the next ten years before and after the proposed change. These projections also account for the market gains and losses prior to June 30, 2014 that are scheduled to be recognized in the next two years. Due to time constraints, the simplified projection methods are based on:

- the June 30, 2014 covered payroll projected with wage inflation;
- a closed group payroll population projection to determine the (current) Defined Benefit payroll;
- computed contributions based on funding value and market value as of June 30, 2014;
- closed amortization periods that are the equivalent single amortization period for the specific group (Non-uniform – 16.3 years on a valuation asset basis or 17.2 years on a market asset basis);
- no future gains or losses (beyond the market gains and losses already experienced); and
- the cost of the 5-year vesting is not shown in the projection due to not achieving 90% funded status. The long term effect of this change is highly dependent on the assumptions and demographics in place at implementation, both of which may materially change in the future.

**Comment 5:** HB 485 states that annual post-retirement cost-of-living increases will be capped at 2%, instead of the current 5%. If the proposed COLA provision (80% of CPI, capped at 2% annually) had been in place during the past 20 years the average annual COLA would have been approximately 1.6%, based on historical CPI increases over the last 20 years. Therefore, we have used an assumed COLA of 1.6% for the cost estimates of the normal cost under the proposed provisions.

**MPERS**  
**Supplemental Actuarial Valuation**  
**as of June 30, 2014**

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**Comments**

**Comment 6:** For the simplified projections shown, we assumed that Tier 2011 hires' payroll would represent an additional 5% of the total each year and that 80% of the new hires would be non-uniform members. The table below shows the percentages of payroll in the first few years of the projection as an illustration:

June 30,	Before Proposal		After Proposal		
	Pre 2011	Post 2011	Pre 2016	Pre 2011	
				Non-Uniform	Uniform
2015	85%	15%	100%		
2016	80%	20%	100%	4%	1%
2017	75%	25%	100%	8%	2%
2018	70%	30%	100%	12%	3%

**Comment 7:** HB 485 states that the vesting/eligibility requirement will drop from 10 years to 5 years once the System becomes at least 90% funded. It cannot be known in advance when the System will reach a particular funding level. In addition, if the funded status does reach at least 90% in the future, it may subsequently go below 90% in future years as a result of experience gains or losses. HB 485 does not state what would occur in this scenario. The results in the Discussion on page 3 illustrate the impact under both scenarios (10-year and 5-year vesting/eligibility requirements). The net long-term employer contributions under the 5-year vesting/eligibility requirement are slightly less than under the 10-year vesting/eligibility requirement, mostly due to lower potential future refunds.

**Comment 8:** The proposal does not specify vesting of the 3% employer defined contribution rate nor does it discuss the treatment of forfeitures for non-vested employer DC contributions. For purposes of this supplemental valuation, we have assumed that the DC vesting will be immediate and therefore there will be no forfeitures.

**Comment 9:** It was assumed that the proposed change in benefits would not result in a change in average member behavior (such as accelerating or delaying patterns of retirement). If such a change emerges, cost implications will be different than shown, herein.

**Comment 10:** The Board has recently adopted a contribution policy that includes a contribution stabilization reserve. If this reserve is maintained so as to keep the defined benefit contribution level, then the proposed plan change may result in 1) an increase in employer contributions due to the DC component and 2) an acceleration of the funded status of the DB plan.

**Comment 11:** This calculation is based upon assumptions regarding future events, which may or may not materialize. It is also based upon present and proposed plan provisions that are outlined in the report. If you have reason to believe that the assumptions that were used are unreasonable, that the plan provisions are incorrectly described, that important plan provisions relevant to this proposal are not described, or that conditions have changed since the calculations were made, you should contact the authors of this report prior to relying on information in the report.

**MPERS**  
**Supplemental Actuarial Valuation**  
**as of June 30, 2014**

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**Comments**

**Comment 12:** This report is intended to describe the financial effects of the proposed plan changes. No statement in this report is intended to be interpreted as a recommendation in favor of or in opposition to the proposed changes.

**Comment 13:** In the event that more than one plan change is being considered, it is very important to remember that the results of separate actuarial valuations cannot generally be added together to produce a correct estimate of the combined effect of all of the changes. The total can be considerably greater than the sum of the parts due to the interaction of various plan provisions with each other, and with the assumptions that must be used.

**Comment 14:** A comparison of the expected benefit levels and a comparison of the volatility of valuation results (before and after the proposed changes) was outside the scope of this project.