January 28, 2021

Ms. Maria Walden
Director of Legislation and Policy
PSRS and PEERS of Missouri
3210 W. Truman Blvd.
Jefferson City, MO 65109

Re: Public School Retirement System of Missouri - Reinstatement of the 2.55% Benefit Formula Multiplier After 32 Years of Service ("2.55% at 32 Years")

Dear Maria:

As requested and pursuant to our engagement letter with the Public School and Education Employee Retirement Systems of Missouri ("PSRS and PEERS of Missouri") dated July 11, 2019, we have estimated the fiscal impact of proposed changes to the Public School Retirement System ("PSRS", or "System"). The proposed changes are similar to 2020 House Bill 1298 ("HB 1298"), a copy of which was provided to us by PSRS and PEERS of Missouri on November 25, 2020.

The remainder of this letter includes our understanding of the proposed change, a description of the analysis we performed, and the results of our analysis. Our assessment of risk and summaries of the actuarial assumptions, actuarial methods, benefit provisions, and other disclosures related to our analysis can be found in the following enclosed exhibits:

- Exhibit I - Assessment and Disclosure of Risk
- Exhibit II - Summary of Actuarial Assumptions and Methods
- Exhibit III - Summary of Plan Provisions
- Exhibit IV - Disclosures

Summary of Proposed Changes

- Current Plan Provisions: Members who are eligible to receive a Normal (Unreduced) Retirement Benefit receive an amount equal to 2.50% of Final Average Salary for each year of Membership Service. A minimum benefit applies for Members with at least 15 years of Creditable Service and varies from $600/month at 15 years of Creditable Service to $1,200/month at 30 years of Creditable Service. Benefits are also subject to a maximum equal to 100% of the Member's Final Average Salary at the time of retirement.

- Proposed modification to Plan Provisions: Members retiring with at least 32 years of Membership Service will receive a benefit equal to 2.55% of Final Average Salary for each year of Membership Service.

- Effective Date for Provisions: Similar changes in HB 1298 included an emergency clause that would be effective immediately upon adoption. For purposes of our analysis, we have assumed the proposed changes are effective July 1, 2020.

Explanation of Estimated Fiscal Impact

The Present Value of Future Benefits ("PVFB") shown on the following page represents the present value of all benefits expected to be paid to current members of the System. This includes benefits that have been earned through service rendered to date, as well as benefits that are expected to be earned through future service based on assumptions for timing of termination or retirement, and future salary increases, among others. The Actuarial Accrued Liability ("AAL") is the portion of the PVFB attributed to past service using the Entry Age Normal (level percent of pay) actuarial cost method, consistent with the Board's funding policy. The Normal Cost ("NC") is the portion of the PVFB attributed to the year following the valuation date using the same method.

The Actuarially Determined Contribution ("ADC") Rate shown above is the sum of two components:

1. The Normal Cost Rate - The ongoing cost of future benefit accruals, as a percentage of covered payroll.
2. The UAAL Rate - The cost of amortizing the current unfunded AAL, as a percentage of covered payroll.

A change in benefit provisions or actuarial assumptions typically affects the actuarial valuation of the PVFB, and therefore the amount of PVFB attributed to past service, or AAL, and future service, or Normal Cost. This in turn affects calculation of the ADC Rate due to resulting changes in the AAL and Normal Cost. The estimated affect on the PVFB, AAL, Normal Cost, and ADC Rate represent the estimated fiscal impact of the proposed changes to the benefit provsions.

A proposed change to the benefit formula or actuarial assumptions that increases the PVFB represents an expected increase in the value of benefits that will be paid to current members. The expected additional ongoing cost for such a change, as a percentage of covered payroll, is represented by the change in ADC Rate. The opposite is also true, in that a proposed change that decreases the PVFB represents an expected decrease in the value of benefits that will be paid to members. The expected reduction in ongoing cost for such a change, as a percentage of covered payroll, is again represented by the change in ADC Rate.

Analysis

Based on the retirement experience observed prior to July 1, 2014 when the 2.55% benefit formula multiplier was previously available to members after 31 years of service, we expect a larger percentage of active members to continue working and delay retirement until they earn 32 years of service if the proposed changes are enacted. Delaying retirement until after 32 or more years of service in order to receive the 2.55% benefit formula multiplier would result in a higher monthly benefit for PSRS members who do so. However, the present value of the delayed monthly benefit is less than the present value of an unreduced benefit commencing immediately upon reaching 30 years of service under the 2.50% benefit formula multiplier based on the current discount rate, salary growth, cost-of-living increase, and mortality assumptions. The reasons are that delaying retirement would:

- result in the member forgoing receipt of benefit payments and reduce the period of time that the participant would receive pension payments; and
- delay future cost-of-living adjustments, to the extent future cost-of-living increases are offered.

Analysis (Continued)

As such, the PVFB for current PSRS members is estimated to decrease when the 2.55% benefit formula is available because a larger percentage of members are assumed to delay retirement until they earn 32 years of service or more. To the extent members do not change retirement behavior and the assumptions are unchanged, the impact of the benefit change would be an increase in PVFB, as those that are currently assumed to retire on or after 32 years of service will receive a larger benefit after the amendment.

As discussed and agreed with PSRS, the results are based on an assumed change in the retirement pattern. Please note that we have included a sensitivity to the retirement rate assumption in the risk analysis presented in Exhibit I.

2.55% at 32 Years
Reinstatement of the 2.55% Benefit Formula Multiplier After 32 Years of Service

Estimated Fiscal Impact

	BASELINE - June 30, 2020 Valuation	2.55% at 32 Years[1]
Funded Status		
Present Value of Future Benefits ("PVFB"):		
Member Contribution Balances	$8,268,226,449	$8,268,226,449
Actives [2]	18,716,214,677	18,612,700,880
Inactives [3]	169,697,361	169,697,361
Retirees, Beneficiaries, and Disableds	30,515,563,219	30,515,563,219
Total PVFB	$57,669,701,706	$57,566,187,909
Estimated Impact		($103,513,797)
Actuarial Accrued Liability ("AAL"):		
Member Contribution Balances	$8,268,226,449	$8,268,226,449
Actives [2]	10,687,533,378	10,506,337,478
Inactives [3]	169,697,361	169,697,361
Retirees, Beneficiaries, and Disableds	30,515,563,219	30,515,563,219
Total AAL	$49,641,020,407	$49,459,824,507
Estimated Impact		($181,195,900)
Actuarial Value of Assets ("AVA")	41,705,058,666	41,705,058,666
Unfunded Actuarial Accrued Liability (AAL - AVA)	$7,935,961,741	$7,754,765,841
Funded Percentage (AVA / AAL)	**84.01%**	**84.32%**
Estimated Impact		**0.31%**
Actuarially Determined Contribution Rate		
Anticipated Payroll [4]	$4,919,286,103	$4,924,202,364
Normal Cost Rate:		
Normal Cost Amount [1]	$859,537,572	$853,511,377
Percentage of Payroll	17.47%	17.33%
Estimated Impact		(0.14%)
Unfunded Actuarial Accrued Liability Rate ("UAAL Rate"): [5]		
UAAL Annual Amortization Amount	$560,501,741	$549,715,153
Percentage of Payroll	11.39%	11.16%
Estimated Impact		(0.23%)
Actuarially Determined Contribution Rate ("ADC Rate"):		
Percentage of Payroll	**28.86%**	**28.49%**
Estimated Impact		**(0.37%)**
Key Assumptions and Notes		
Discount Rate	7.50%	7.50%
Payroll Growth	2.75%	2.75%

1 Reflects a change in assumed retirement behavior for active participants to reflect a larger percentage of members working to 32 years of service and beyond to receive the higher benefit multiplier.
2 Includes 1,990 members who retired in July 2020 and assumed to not be impacted by the proposed change.
3 Includes 23 members who retired in July 2020 and assumed to not be impacted by the proposed change.
4 Excludes anticipated payroll for members at or over the age at which the retirement rate is 100%.
5 Decrease in AAL is amortized over 30 years in the development of the Actuarially Determined Contribution Rate.

Please see the enclosed exhibits for summaries of identified risks associated with the proposed change and summaries of the assumptions, methods, and plan provisions reflected in our analysis.

Please call if you have any questions or if you require additional information.

Sincerely,

Cindy Fraterrigo

Cindy Fraterrigo, FSA, EA, MAAA

Brandon A. Robertson

Brandon Robertson, ASA, EA, MAAA

cc: Dearld Snider - PSRS and PEERS of Missouri
Anita Brand - PSRS and PEERS of Missouri
Becky Stanton - PwC
Nathan Benya - PwC

Assessment and Disclosure of Risk

A. Assessment of Risk - BASELINE (June 30, 2020 Valuation)

The BASELINE actuarial valuation of liabilities and calculation of contributions presented herein is consistent with the June 30, 2020 actuarial valuation of the System. Please see the June 30, 2020 actuarial valuation report, dated November 12, 2020, for an assessment of the risks associated with the measurement of pension liability and contributions.

Assessment and Disclosure of Risk

B. Assessment of Risk - 2.55% at 32 Years

We do not believe the proposed changes would introduce new risks, or significantly alter the level of the risks, identified in our June 30, 2020 actuarial valuation report for the System overall. However, below is an assessment of risks specific to our estimatation of the fiscal impact of the proposed changes.

- Demographic Risk - Our estimated fiscal impact of the proposed change is a function of assumed retirement behavior. The actual fiscal impact of the proposed change would be based on actual future retirement behavior. If none of the current members delay retirement and all future demographic experience is consistent with the assumptions used in the BASELINE valuation, the impact of the benefit change would be an increase of $62.8 million in PVFB and an increase of 0.11% in the ADC Rate, compared to the BASELINE results shown in the Estimated Fiscal Impact exhibit. Similarly, if more members were to delay retirement, the decrease in PVFB and ADC Rate would be greater than shown in the Estimated Fiscal Impact exhibit.

Summary of Actuarial Assumptions and Methods

A. Actuarial Assumptions - BASELINE (June 30, 2020 Valuation)

The actuarial assumptions used in the BASELINE actuarial valuation presented herein are the same assumptions used in the June 30, 2020 actuarial valuation. Please see the June 30, 2020 actuarial valuation report, dated November 12, 2020, for a complete disclosure of all actuarial assumptions. Assumptions used in the BASELINE valuation that were modified in order to estimate the fiscal impact of the proposed changes, if any, are presented below to allow for comparison with the modifed assumptions.

Retirement

Retirement is assumed in accordance with the following rates per 1,000 eligible members:

	Service										
Age	<=20	21	22	23	24	25	26	27	28	29	>=30
<50	0	0	0	0	0	50	30	30	30	30	450
50	0	0	0	0	0	50	30	30	30	30	450
51	0	0	0	0	0	50	30	30	30	200	450
52	0	0	0	0	0	50	30	30	200	200	450
53	0	0	0	0	0	50	30	300	200	200	450
54	0	0	0	0	0	50	300	200	200	200	450
55	50	50	50	50	50	400	200	200	200	200	450
56	30	30	30	30	400	200	200	200	200	200	450
57	30	30	30	400	200	200	200	200	200	200	450
58	30	30	400	200	200	200	200	200	200	200	450
59	30	400	200	200	200	200	200	200	200	200	450
60	150	150	150	150	150	200	200	200	200	200	450
61	150	150	150	150	150	200	200	200	200	200	450
62	150	150	150	150	150	200	200	200	200	200	450
63	150	150	150	150	150	200	200	200	200	200	450
64	150	150	150	150	150	200	200	200	200	200	450
65	250	250	250	250	250	400	400	400	400	400	450
66	250	250	250	250	250	300	300	300	300	300	450
67	250	250	250	250	250	300	300	300	300	300	450
68	250	250	250	250	250	300	300	300	300	300	450
69	250	250	250	250	250	300	300	300	300	300	450
>=70	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000

Summary of Actuarial Assumptions and Methods

B. Actuarial Assumptions - 2.55% at 32 Years

Based on the retirement experience observed prior to July 1, 2014, when the 2.55% benefit formula multiplier was previously available to members after 31 years of service, we would expect a larger percentage of active members to continue working and delay retirement until they earn 32 years of service if the proposed changes are enacted. For our analysis, we assumed retirement rates for 32 years of service or more would be consistent with the current retirement rates determined as a result of our 2016 experience study. We have assumed retirement rates at 31 years of service (the year before the 2.55% formula factor would be reached) would reduce from the current assumption and revert to the same rates assumed for members with 30 years of service that were approved by the Board and used in the annual valuations of the System prior to July 1, 2014 and that have been used in prior fiscal analyses of similar proposals to reinstate the 2.55% benefit formula multiplier at 31 years of service. We assumed retirement rates for 30 years of service were in between the assumed retirement rates for 31 and 32 or more years of service. We also assumed there would be a gradual decrease in the retirement rates for members who would qualify for an unreduced benefit with 25 to 29 years of service that are under age 60.

Retirement

Retirement is assumed in accordance with the following rates per 1,000 eligible members (the rates in bold font differ from those used in the June 30, 2020 valuation):

	Service												
Age	< = 20	21	22	23	24	25	26	27	28	29	30	31	> = 32
<= 50	0	0	0	0	0	50	30	30	30	30	**350**	**200**	450
51	0	0	0	0	0	50	30	30	30	**150**	**350**	**200**	450
52	0	0	0	0	0	50	30	30	**160**	**150**	**350**	**200**	450
53	0	0	0	0	0	50	30	**270**	**160**	**150**	**350**	**200**	450
54	0	0	0	0	0	50	**280**	**170**	**160**	**150**	**350**	**200**	450
55	50	50	50	50	50	**390**	**180**	**170**	**160**	**150**	**350**	**200**	450
56	30	30	30	30	400	**190**	**180**	**170**	**160**	**150**	**350**	**200**	450
57	30	30	30	400	200	**190**	**180**	**170**	**160**	**150**	**350**	**200**	450
58	30	30	400	200	200	**190**	**180**	**170**	**160**	**150**	**350**	**200**	450
59	30	400	200	200	200	**190**	**180**	**170**	**160**	**150**	**350**	**200**	450
60	150	150	150	150	150	200	200	200	200	200	**350**	**200**	450
61	150	150	150	150	150	200	200	200	200	200	**350**	**200**	450
62	150	150	150	150	150	200	200	200	200	200	**350**	**200**	450
63	150	150	150	150	150	200	200	200	200	200	**350**	**200**	450
64	150	150	150	150	150	200	200	200	200	200	**350**	**200**	450
65	250	250	250	250	250	400	400	400	400	400	**400**	**400**	450
66	250	250	250	250	250	300	300	300	300	300	**400**	**300**	450
67	250	250	250	250	250	300	300	300	300	300	**400**	**300**	450
68	250	250	250	250	250	300	300	300	300	300	**400**	**300**	450
69	250	250	250	250	250	300	300	300	300	300	**400**	**300**	450
>= 70	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000

All assumptions other assumptions are the same as the Baseline.

Summary of Actuarial Assumptions and Methods

C. Actuarial Methods - BASELINE (June 30, 2020 Valuation)

The actuarial methods used in the BASELINE actuarial valuation presented herein are the same assumptions used in the June 30, 2020 actuarial valuation. Please see the June 30, 2020 actuarial valuation report, dated November 12, 2020, for a complete disclosure of all actuarial methods. Methods used in the BASELINE valuation that were modified in order to estimate the fiscal impact of the proposed changes, if any, are presented below to allow for comparison with the modifed assumptions.

Summary of Actuarial Assumptions and Methods

D. Actuarial Methods - 2.55% at 32 Years

All methods are the same as the BASELINE valuation.

Summary of Plan Provisions

A. Plan Provisions - BASELINE (June 30, 2020 Valuation)

The plan provisions reflected in the BASELINE actuarial valuation presented herein are the same plan provisions reflected in the June 30, 2020 actuarial valuation. Please see the June 30, 2020 actuarial valuation report, dated November 12, 2020, for a complete disclosure of all plan provisions that are pertinant to the valuation. Plan provisions reflected in the BASELINE valuation that will be modified by the proposed change, if any, are presented below to allow for comparison with the modifed provisions.

Normal (Unreduced) Retirement

Benefit: Members who are eligible to receive a Normal (Unreduced) Retirement Benefit receive an amount equal to 2.50% of Final Average Salary for each year of Membership Service. A minimum benefit applies for Members with at least 15 years of Creditable Service and varies from $600/month at 15 years of Creditable Service to $1,200/month at 30 years of Creditable Service. Benefits are also subject to a maximum equal to 100% of the Member's Final Average Salary at the time of retirement.

Summary of Plan Provisions

B. Plan Provisions - 2.55% at 32 Years

Our understanding of the plan provisions, as modified by the proposed change, are presented below.

Normal (Unreduced) Retirement

Benefit: Members who are eligible to receive a Normal (Unreduced) Retirement Benefit receive an amount equal to 2.50% of Final Average Salary for each year of Membership Service. A minimum benefit applies for Members with at least 15 years of Creditable Service and varies from $600/month at 15 years of Creditable Service to $1,200/month at 30 years of Creditable Service. Benefits are also subject to a maximum equal to 100% of the Member's Final Average Salary at the time of retirement.

Members retiring with at least 32 years of Membership Service will receive a benefit equal to 2.55% of Final Average Salary for each year of Membership Service.

Similar changes in HB 1298 included an emergency clause that would be effective immediately upon adoption. For purposes of our analysis, we have assumed the proposed changes are effective July 1, 2020.

Disclosures

The information herein has been prepared pursuant to our engagement letter with PSRS and PEERS of Missouri, dated July 11, 2019. Our analysis was performed based on our understanding of the current PSRS benefit provisions as set forth in RSMo Chapter 169, as well as the proposed modification to those statutes, which are similar to HB 1298.

Our analysis of the impact reflects the proposed changes in plan provisions and changes in actuarial assumptions shown in Exhibits II and III. Our analysis was performed by measuring the impact of the change at June 30, 2020, the most recent date that we collected member census data from PSRS and PEERS of Missouri and performed a valuation of PSRS. Our estimates do not incorporate the impact of future employees who may become members of PSRS. Please refer to our actuarial valuation report dated November 12, 2020 for a summary of the census data. Otherwise, our analysis reflects the same census data, assumptions, methods, and plan provisions used in the June 30, 2020 actuarial valuation of PSRS. While the scope of our engagement did not call for us to perform an audit or independent verification of this information, we have reviewed this information for reasonableness. The accuracy of the results presented in this letter is dependent upon the accuracy and completeness of the underlying information.

The results of our analysis presented herein were computed using assumptions and methods that are consistent with the funding policy adopted by the Board of Trustees of PSRS and PEERS of Missouri. The results do not reflect application of Governmental Accounting Standards applicable to pension plans.

Our analysis illustrates the estimated change in the Actuarially Determined Contribution Rate ("ADC Rate"), which may or may not affect the actual contribution rates set by the Board. Our analysis does not include any additional administrative cost that may be incurred by PSRS and PEERS of Missouri to implement this change. A stochastic model of potential results on a forecasted basis was not completed due to the limited scope of our engagement.

In preparing the results presented herein, we have used and evaluated actuarial models in accordance with Actuarial Standards of Practice ("ASOP") No. 56. PwC uses the ProVal valuation system developed by Winklevoss Technologies, LLC in performing valuations of pension and postretirement benefit plans. We have utilized the ProVal software to prepare the valuation results presented herein. ProVal is used to value participant data through projecting retirement benefits and applying plan specific assumptions, methods and plan provisions under applicable accounting and funding standards. PwC is not aware of any material limitations or known weaknesses in the ProVal software.

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.

No statement in this letter is intended as a recommendation in favor, or in opposition, of the proposed changes. Except as otherwise noted, potential impacts on other benefit plans were not considered.

The analysis presented herein is based upon assumptions regarding future events. However, the plan's long term costs will be determined by actual future events, which may differ materially from the assumptions that were made. The calculations are also based upon present and proposed plan provisions that are outlined in the letter. If you have reason to believe that the assumptions 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, please contact the author of this letter prior to relying on information in the letter.

If you have reason to believe that the information provided in this letter 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 letter, please contact the author of this letter prior to making such decision.

In the event that more than one plan change is being considered, it should be noted 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 or less 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.

Disclosures

To the best of our knowledge this actuarial statement is complete and accurate and has been prepared in accordance with generally accepted actuarial principles and practice and with the Actuarial Standards of Practice issued by the Actuarial Standards Board. Our calculations are also consistent with our understanding of Missouri state law. The undersigned actuaries are members of the Society of Actuaries and other professional organizations, including the American Academy of Actuaries, and meet the Qualification Standards for Actuaries Issuing Statements of Actuarial Opinion in the United States relating to pension plans. There is no relationship between the PwC practitioners involved in this engagement and PSRS and PEERS of Missouri that may impair our objectivity.

The content of this document is limited to the matters specifically addressed herein and does not address any other potential tax consequences, or the potential application of tax penalties, to any matter other than as set forth herein. Our conclusions are not binding upon any taxing authority or the courts and there is no assurance that any relevant taxing authority will not successfully assert a contrary position. In addition, no exceptions (including the reasonable cause exception) are available for any federal or state penalties imposed if any portion of a transaction is determined to lack economic substance or fails to satisfy any similar rule of law, and our advice will not protect you from any such penalties. This document supersedes all prior written or oral advice with respect to the issues addressed in this document and all such prior communications should not be relied upon by any person for any purpose. This document has been prepared pursuant to an engagement letter between PSRS and PEERS of Missouri and PwC, and is intended solely for the use and benefits of PSRS and PEERS of Missouri and not for reliance by any other person.