COMMONWEALTH OF PENNSYLVANIA May 17, 2016

PUBLIC EMPLOYEE RETIREMENT COMMISSION

ACTUARIAL NOTE SUMMARY

House Bill Number 727, Printer's Number 1555,
as amended by Amendment Nos. 06859 (Tobash) and 06888 (Vereb):
Public School Employees' Retirement System and State Employees' Retirement System;
Hybrid Retirement Benefit Plan

Summary of the Bill

House Bill Number 727, Printer's Number 1555, as amended by Amendment Numbers 06859 and 06888, would amend the Public School Employees' Retirement Code, the State Employees' Retirement Code and the Military Code. The bill would impose a series of retirement benefit changes upon the Public School Employees' Retirement System (PSERS) and the State Employees' Retirement System (SERS) as follows: 1) create new membership classes for PSERS and SERS employees hired after June 30, 2017 and December 31, 2016, respectively; 2) establish defined contribution (DC) plans for new members; and 3) revise certain funding provisions of the retirement systems. More specifically, the amendments would amend the Codes in the following manner.

Amendment Number 06859 would amend the Public School Employees' Retirement Code to:

1) Effective July 1, 2017, establish a hybrid benefit tier, which includes defined benefit and defined contribution components, applicable to all new school employees or employees returning after a break in service. Current members of PSERS returning after a break in service would have a one-time option to become a member of the new hybrid benefit tier.

2) Under the defined benefit component, school employees would become members of "Class T-G" and would earn benefits at a 2% benefit accrual rate. A member would be vested in the defined benefit component after accumulating 10 years of service credit. The benefit formula would be equivalent to 2% multiplied by the member's years of service (maximum of 25 years), multiplied by the member's final average salary (highest five years), with an annual pay limit of $50,000 indexed by 1% per year. Class T-G members would contribute 6% of compensation for the first $50,000 for the first 25 years of service.

3) Establish a defined contribution plan under a new chapter of the Code, Chapter 84, called the School Employees' Defined Contribution Plan, for school employees to contribute 1% of compensation of the first $50,000 for the first 25 years of

Summary of the Bill (Cont'd)

service, and 7% of compensation on pay above $50,000 or any service over 25 years. The employer contribution would be 0.5% of the member's first $50,000 of compensation for the first 25 years of service, and 4% of compensation on pay above $50,000 or any service over 25 years.

Amendment Number 06859 would amend the State Employees' Retirement Code to:

1) Effective January 1, 2017, establish a hybrid benefit tier, which includes defined benefit and defined contribution components, applicable to most new State employees or employees returning after a break in service. New members of the Pennsylvania State Police would be exempt from joining the new hybrid benefit tier. Current members of SERS returning after a break in service would have a one-time option to become a member of the new hybrid benefit tier.

2) For the defined benefit portion, most State employees would become members of "Class A-5" and would earn benefits at a 2% benefit accrual rate. A member would be vested in the defined benefit component after accumulating 10 years of service credit. The benefit formula would be equivalent to 2% multiplied by the member's years of service (maximum of 25 years), multiplied by the member's final average salary (highest five years), with an annual pay limit of $50,000 indexed by 1% per year. Class A-5 members would contribute 6% of compensation for the first $50,000 for the first 25 years of service.

3) Establish a defined contribution plan under a new chapter of the Code, Chapter 58, known as the State Employees' Defined Contribution Plan, for most State employees to contribute 1% of compensation of the first $50,000 for the first 25 years of service, and 7% of compensation on pay above $50,000 or any service over 25 years. The employer contribution would be 0.5% of the member's first $50,000 of compensation for the first 25 years of service, and 4% of compensation on pay above $50,000 or any service over 25 years.

Amendment Number 06888 would amend the State Employees' Retirement Code to:

1) Exempt a sworn officer of the Pennsylvania State Police and certain other hazardous duty employees from membership in the new hybrid benefit tier. All prospective employees of this group would continue to be eligible for membership in Class A-3 in SERS until they become eligible for the enhanced State Trooper retirement benefits upon attaining 20 years of credited service. For this amendment, "certain other hazardous duty employees" include: wildlife conservation officers and other commissioned law enforcement personnel employed by the Game Commission; Delaware River Port Authority Policeman, park rangers or Capitol Police officers; campus police officers employed by any State-owned educational institutions, community college or Penn State University; and police officers employed by Fort Indiantown Gap or other designated Commonwealth military installations and facilities.

Actuarial Data

Impact on Employer Contributions if
Amendment A06859 to House Bill 727, PN 1555 is enacted
For Fiscal Years 2016-2017 through 2048-2049
(Amounts in millions and based on System actuary's projections; any provision for use of plan savings is not included in these projections)

	Cash Flow Costs / (Savings) as determined by System Actuary	Present Value of Cash Flow Costs / (Savings) at 3.9% as of June 30, 2016	Present Value of Cash Flow Costs / (Savings) at 7.5% as of June 30, 2016
Without Amendment A06888			
PSERS	$(4,025.2)	$(1,732.6)	$(870.0)
SERS	(5,918.5)	(2,440.7)	(1,199.2)
Total	(9,943.7)	(4,173.3)	(2,069.2)
With Amendment A06888			
PSERS	$(4,025.2)	$(1,732.6)	$(870.0)
SERS	(5,734.3)	(2,361.5)	(1,158.8)
Total	(9,759.5)	(4,094.1)	(2,028.8)

The chart above shows the present value of the expected cash flow costs/(savings) as of June 30, 2016, assuming end of year payment, at 3.9% (a proxy for budget growth) and 7.5% (the current investment return for the Systems). The 3.9% proxy for budget growth is based on the annual growth in estimated general fund revenue from 2017-2018 to 2019-2020 shown on page C1-12 in the Governor's Executive Budget for 2015-2016.

The chart reflects the 2018 effective dates reflected in the System actuaries' estimates. If the 2017 effective dates in the Amendment were reflected instead, an additional year of savings would be expected to be reflected during the projection period; however such savings would be offset by the cost of the Commonwealth's guaranteed 4% return on DC contributions prior to the establishment of the DC plan trust and any additional administrative expenses for the DC plan trust during the interim period.

Attachments

Actuarial Note prepared by Timothy J. Nugent, Scott F. Porter, and Katherine A. Warren of Milliman, Consulting Actuary of the Public Employee Retirement Commission, and the attached white paper published by the Conference of Consulting Actuaries Public Plans Community, entitled *Actuarial Funding Policies and Practices for Public Pension Plans*, October 2014.

Attachments (Cont'd)

Actuarial cost estimate prepared by Buck Consultants, Consulting Actuary of the Public School Employees' Retirement System.

Actuarial cost estimate (A06859) prepared by Hay Group, consulting actuary of the State Employees' Retirement System.

Actuarial cost estimate (A06888) prepared by Hay Group, consulting actuary of the State Employees' Retirement System.

Amendment Number 06859.

Amendment Number 06888.

Milliman

1550 Liberty Ridge Drive
Suite 200
Wayne, PA 19087-5572

Tel +1 610 687.5644
Fax +1 610.687.4236

www.milliman.com

May 16, 2016

Mr. Bernard Kozlowski
Acting Executive Director
Public Employee Retirement Commission
P.O. Box 1429
Harrisburg, PA 17105-1429

Re: Amendment A06859 to House Bill 727, Printer's Number 1555, and as amended by Amendment A06888

Dear Mr. Kozlowski:

As requested, we have prepared an actuarial note on Amendment A06859 to House Bill 727, Printer's Number 1555 as well as this Amendment further modified by Amendment A06888.

Due to time constraints dictated by the Commission for providing this actuarial note by May 16, 2016, we are providing this letter on an accelerated basis. In particular, we were provided with the project assignment on May 6, the PSERS actuarial cost estimate on May 10, and the SERS actuarial cost estimate on May 12. In order to adequately review any actuarial cost note produced by the system actuaries, Milliman provided the Commission a letter on May 26, 2015 indicating supplementary information to be provided to us along with the Systems' cost estimates. This information was not provided prior to May 16. If additional time was available, some of the issues described in this letter could have been discussed with the Systems' actuaries in more detail, leading to potentially additional and/or different commentary. Additional time may have also afforded the possibility that issues that are not presented in this actuarial note could have been discovered, opined upon, and addressed further.

Please note this is a lengthy commentary on the Amendment, which is indicative of the significant changes proposed to PSERS and SERS for the two multi-billion dollar systems. Comments and discussion on benefits, actuarial methods, and the projections completed by the System actuaries are included throughout this actuarial note. Our comments and discussion are summarized in the following Executive Summary.

Executive Summary

This actuarial note on Amendment A06859 to House Bill 727, Printer's Number 1555 and as amended by Amendment A06888 contains several items that we believe are important to the reader. These items are summarized below and are expanded in further detail throughout this actuarial note.

- The effective dates included in the analyses prepared by the Systems' actuaries reflect effective dates one year later than included in the Amendment. The Systems' actuaries' cost notes did not reflect the holding vehicle trust that provides for the delay in establishment of a defined contribution trust. We suggest that this provision be discussed in more detail with the Systems to determine the effective date prior to enactment. (See pages 16 and 17 for discussion).
- §8406.1 and §5806.1 indicate that it is the General Assembly's intent to make an annual appropriation from the General Fund to the Systems equal to the difference between the current aggregate employer contributions and the aggregate employer contribution that would have been required by Act 120-2010. This would be an important departure than previous potential changes to the Systems from decreasing costs to decreasing the unfunded liability. However, neither cost note by the System actuaries incorporated this provision due to the uncertainty on how the calculation was to be determined. (See page 15 for discussion)
- The determination of the normal cost rate for Class T-G and Class A-5 members was interpreted differently by the actuaries for each of the systems. We suggest the description of the normal cost determination be modified to remove any ambiguity. Hay had determined the normal cost over a maximum 25-year service period whereas Buck determined the normal cost over the member's entire working lifetime. Based upon the intent of the language, the analysis for one of the systems may need to be modified, which could alter the estimated contributions during the projection period included in the actuaries' analysis. (See page 14 for discussion)
- We believe that consideration should be given to explicitly modify the normal cost determination for SERS such that the normal cost rate is determined based on all active members in the System (rather than the average new member), similar to the method already in use for PSERS. Please note that the language in the Amendment now explicitly states the normal cost for PSERS is based on all active members rather than the average new member. (See page 12 for discussion)
- In determining the dollar amounts of employer contributions to be paid each fiscal year, the normal contribution and the PSERS premium assistance contribution are based on compensation up to the Defined Benefit Compensation Limit for the first 25 years of service for Class T-G members (and on all compensation for non-Class T-G members). Buck's actuarial cost note determined all contribution rates on total

compensation and applied them to total compensation for all members in determining the dollar amounts paid. We do not believe the different methodology would result in different estimated contribution dollars. We suggest that this provision be discussed with PSERS to determine the most effective method for setting the rates and determining the employer contribution dollars. (See page 14 for discussion)

- We believe consideration should be given to reducing the amortization period used for changes in the normal cost rate for SERS (if the current method is not modified) as well as the period used for all future actuarial gains or losses for both systems. (See page 13 for discussion)
- In light of the potential reduction in employer provided benefits, consideration should be given to having a formal analysis conducted to review member benefit adequacy reflecting varying economic scenarios. (See page 11 for discussion)
- We are concerned that the mortality assumption used by the actuaries is stagnant throughout the projection period thereby underestimating life expectancies and understating employer cost savings from the Amendment. (See pages 17 and 18 for discussion)
- We are concerned that the new employee cohort utilized for PSERS may not lead to expected ratios of long-term future levels of full-time versus part-time membership. (See page 17 for discussion)
- Prior to the Amendment's enactment, we suggest that the following be reviewed to ensure the intent of the Amendment's sponsors.
    - For PSERS, we do not believe the language is clear that shared risk contributions would cease upon completion of 25 years of service. We do note that Buck has interpreted the Amendment such that shared risk contributions cease at 25 years, which is also consistent with the language for SERS. We recommend that the language be reviewed to determine if additional clarification is required.
    - The language in determining the Defined benefit compensation limit" for PSERS and "Class A-5 annual compensation limit" for SERS is slightly different, which could lead to slightly different limits for each system. We recommend that the same exact language be included for both systems.
    - For each system, language was included to use savings from this Amendment to reduce the unfunded liability rather than reduce costs, but neither actuary understood how to interpret the provision and thus, it was not reflected in their analysis. We suggest this provision be clarified.

Summary of the Amendment

Amendment A06859 to House Bill 727, Printer's Number 1555, would amend both the Public School Employees' Retirement Code and the State Employees' Retirement Code to enact significant reforms applicable to future members of the Public School Employees' Retirement System (PSERS) and the State Employees' Retirement System (SERS).

The primary provisions that would impact the actuarial valuations are briefly summarized below.

Future members

Employees who join PSERS on or after July 1, 2017 and most employees who join SERS on or after January 1, 2017 would become members of Class T-G and Class A-5, respectively. State Police (e.g. sworn police officers) and under Amendment A06888, certain other hazardous duty members, would be exempt from becoming Class A-5 members in SERS and instead would continue to be classified as Class A-3 or, if elected, A-4 members. The new benefit tier within each System would continue to be a traditional defined benefit formula, as provided to current members, but with both a compensation limit and a 25 year maximum on credited service along with other changes. Such members would also be enrolled participants in a defined contribution plan maintained by the Board of each System.

Defined Benefit Plan for future members

Except for the following changes, Class T-G members would have the same benefits as current Class T-E members in PSERS and Class A-5 members would have the same benefits as current Class A-3 members in SERS.

- Earnings would be limited for benefit and employee contribution purposes. This "Defined benefit compensation limit" for PSERS and "Class A-5 annual compensation limit" for SERS, (hereafter DB Compensation Limit) would be $50,000 for the 2017-2018 fiscal year for PSERS and the 2017 calendar year for SERS. Such limit would be increased by 1% each year, compounded annually, rounded to the nearest $100.
- The final average earnings would be determined based on the highest average limited compensation received during any 5 years (instead of a 3-year consecutive period).
- Service would be limited to 25 years when determining the member's benefit.
- Class A-5 members would not be eligible for social security integration credits, the

actuarial increase factor or the long service supplement.

- Mandatory member contributions would be 6% of compensation, up to the DB Compensation Limit, for the first 25 years of service, and 0% of compensation after 25 years of service.
- Class T-G and A-5 members would also be subject to the same shared risk adjustments to the member contributions as for classes T-E, T-F, A-3, and A-4 members.
- Superannuation age would be age 65 with 3 years of service.
- While Class T-G and A-5 members would vest after 10 years of service, early retirement would only be available upon 25 years of service on an actuarially equivalent basis. Members who terminate with at least 10 years of service but less than 25 years of service must defer until superannuation age to begin receiving benefits.
- Class T-G members are not eligible for the subsidized early retirement factors upon attainment of age 55 and completion of 25 years of service.
- Vested Class T-G and A-5 members would be unable to withdraw their accumulated member contributions in lieu of any other benefits.
- Class T-G members would not be eligible for the healthcare premium assistance.
- Class T-G and A-5 members would be able to purchase creditable non-school/state service only for non-intervening military service.

Defined Contribution Plan Portion for future participants

The primary features of the new defined contribution plans are as follows:

- Mandatory pre-tax "pick-up" participant contributions as follows:
  - 1% of compensation up to the DB Compensation Limit and 7% of compensation in excess of the DB Compensation Limit for the first 25 years of service.
  - 7% of compensation without regard to the DB Compensation Limit for years of service in excess of 25 years.
- Employer contributions as follows:
  - 0.5% of compensation up to the DB Compensation Limit and 4% of compensation in excess of the DB Compensation Limit for the first 25 years of service.
  - 4% of compensation without regards to the DB Compensation Limit for years of service in excess of 25 years.
- Voluntary participant contributions are allowable only from an eligible roll-over or direct trustee-to-trustee transfer.
- Participant contributions and earnings thereon are 100% vested immediately.

- Employer contributions and earnings thereon would become 100% vested after three years of service.
- Each participant would have an individual investment account where all participant and employer contributions would be accumulated and investment experience, fees, and costs are credited or charged.
- Upon termination of service, a participant may elect a lump sum distribution of the vested individual investment account.
- The receipt of any benefit from the defined contribution plan would not impact the receipt of any vested benefit from the defined benefit plan portion.

In the event the Systems have not yet established the trust for the new defined contribution plan by July 1, 2017 for PSERS and January 1, 2017 for SERS, a temporary holding vehicle trust would be established for the participant and employer contributions to the defined contribution plan. A guaranteed return of 4% per year would be credited on such contributions until the earlier of the transfer of funds to the new DC plan trust, the distribution to participants, or December 31, 2017. The Commonwealth is responsible for making an interest payment to the trust as necessary to guarantee the 4% annual return.

State Police

State Police hired on or after July 1, 2017 would have voluntary overtime in excess of 10% of base salary excluded from pensionable compensation.

State Police would continue to be eligible for the DiLauro Award upon the completion of 20 eligibility points. However, any Class A-5 service (such as from military service, purchased service, or other State service) would not count as eligibility service for the DiLauro Award. Instead any Class A-5 service would result in additional benefits from the System based solely on Class A-5 service.

Funding

<u>PSERS</u>

The Bill, if enacted, would change the following four items with regard to the employer contribution rate determination for PSERS.

1. The normal contribution rate in §8328(b) would be revised effective with the fiscal year beginning July 1, 2016 to be determined as a "level percentage of the compensation of all active members in classes of service other than Class T-G, and for Class T-G members, as limited by the defined benefit compensation limit

and to Class T-G members with less than 25 eligibility points, which percentage, if contributed from the start of their employment on the basis of their prospective compensation through their entire period of active school service, as limited by the defined benefit compensation limit, would be sufficient to fund the liability for any prospective benefit payable to him, in excess of that portion funded by his prospective member contributions", excluding the shared-risk contributions. Previously the normal contribution rate was to be based on the "average new active member". The changes in the wording are now more consistent with the methodology that has been employed in the actuarial valuations for members in classes of service other than Class T-G.

2. The employer's normal cost cannot be less than $0.
3. Employers would pay the normal contribution rate and the premium assistance contribution rate based on total compensation of all active members other than Class T-G members plus total compensation not in excess of the DB Compensation Limit for Class T-G members with less than 25 years of service. Employers would pay the accrued liability contribution rate, the supplemental annuity contribution rate, and the experience adjustment factor on total compensation of active members (in the DB plan) and active participants (in the DC plan).
4. Beginning with the June 30, 2016 actuarial valuation, the actuarial value of assets cannot be less than 70% of the market value of assets nor more than 130% of the market value of assets.

In accordance with §8328(c)(5), any changes in the unfunded accrued liability due to legislation enacted subsequent to June 30, 2015 would be amortized beginning the July 1 second succeeding the date such legislation is enacted over a 10-year period using level percentage of pay amortization payments for all active members and active participants of PSERS.

In addition, an additional source of funding is introduced in §8406.1 Use of plan savings. Each year, PSERS shall determine the difference between the current aggregate employer contributions and the aggregate employer contributions that would have been required by Act 120-2010. Any savings realized shall be utilized to pay down the accrued unfunded liability. Per §8406.1, the General Assembly's intent is to make an annual appropriation from the General Fund to the System in this amount.

SERS

The Bill, if enacted, would change the following three items with regard to the employer contribution rate determination for SERS.

1. The employer's normal contribution rate cannot be less than 0%.
2. The change in the accrued liability as of December 31, 2016 due to this Amendment would be amortized beginning July 1, 2017 over a 20-year period using level annual dollar amortization payments, instead of the current 10-year amortization period for changes in the accrued liability due to legislation.
3. Employers would pay the normal contribution rate based on total compensation of all active members other than Class T-G members plus total compensation not in excess of the DB Compensation Limit for Class T-G members with less than 25 years of service. Employers would pay the accrued liability contribution rate, the supplemental annuity contribution rate, and the experience adjustment factor on total compensation of active members (in the DB plan) and active participants (in the DC plan).

§404 of the Amendment indicates that the costs added by this legislation would not be considered costs added by legislation for purposes of the collared contribution rate.

In addition, an additional source of funding is introduced in §5806.1 Use of plan savings. Each year, SERS shall determine the difference between the current aggregate employer contributions and the aggregate employer contributions that would have been required by Act 120-2010. Any savings realized shall be utilized to pay down the accrued unfunded liability. Per §5806.1, the General Assembly's intent is to make an annual appropriation from the General Fund to the system in this amount.

Summary of the Amendment, as amended by Amendment A06888

Amendment A06888 would exempt certain other hazardous duty members from Class A-5. In addition to sworn police officers, Hay assumed approximately 1,550 positions would also be exempt from becoming Class A-5 members in SERS and instead would continue to be classified as Class A-3 or, if elected, A-4 members.

Discussion of the Amendment, including as further amended by Amendment A06888

Defined Contribution Plans – General Information

Employers have been replacing traditional final average pay defined benefit pension plans in the private sector with defined contribution plans for many years. Many employers have been ending their existing final average pay retirement plan (via benefit freezes or plan terminations) and replacing it with a defined contribution plan or hybrid plan design in an attempt to control plan costs, reduce volatility, and shift some of the

inherent risk associated with maintaining a defined benefit plan from the employer to the employee.

Defined contribution plans shift inflation, investment, and longevity risks from the employer to the employee as the account balance is a function of earnings over the working lifetime of the employee and the investment yield of the funds selected by the employee. As employees typically withdraw account balances upon retirement, they bear the risk of outliving their retirement assets.

With a defined contribution plan, the employer contributions are typically a percentage of member compensation, and can be easily budgeted each year without the added risk of additional contributions due to investment and demographic losses. Forfeitures of non-vested employer contributions with interest from members who terminate employment prior to fully vesting would serve to slightly lower future employer contributions.

New Benefit Tiers

The benefit accrual rate currently applicable to new members in PSERS and for most new members in SERS is 2.0% with a member contribution rate of 7.50% in PSERS and 6.25% in SERS. This benefit structure is similar to benefits provided to other members of PSERS and SERS and provides retirement benefits in a traditional defined benefit formula reflecting a member's highest consecutive 3-year average salary and total years of service.

The Amendment would establish new tiers of benefits and separate defined contribution plans for members entering PSERS and most members entering SERS. State Police would be exempt from the new benefit tier in SERS and would continue to be classified as Class A-3 or, if elected, A-4 members. Under Amendment A06888, in addition to sworn police officers, certain other hazardous duty members would also be exempt from becoming Class A-5 members in SERS. The new tiers would be designed as a final average pay plan with a 2% accrual and a longer averaging period for highest compensation (5 years). Service would be limited to 25 years when determining the member's benefit. Members would be required to contribute 6% of compensation for the first 25 years of service. In addition, compensation would be limited for benefit and employee contribution purposes. The DB Compensation Limit would be $50,000 for the 2017-2018 fiscal year for PSERS and the 2017 calendar year for SERS. Such limit would be increased by 1% each year, compounded annually, rounded to the nearest $100. The averaging period for the highest 5-year average compensation would not be subject to the 25 year service limitation but would be based on the average of the highest 5-year period during a member's career.

New members in the limited final average pay plan tiers would also be enrolled in a defined contribution plan. Members would be required to contribute 1% of compensation up to the DB Compensation Limit and 7% of compensation in excess of the DB Compensation Limit for the first 25 years of service and 7% of total compensation after 25 years of service.

Thus the aggregate member contribution rate would be 7% of total compensation with different allocations to the defined benefit and defined contribution plan depending on compensation and years of service.

Employer contributions to the defined contribution plan would be 0.5% of compensation up to the DB Compensation Limit and 4% of compensation in excess of the DB Compensation Limit for the participant's first 25 years of service and 4% of compensation after 25 years of service. Participants would be vested in the employer contributions and earnings thereon after 3 years of service.

Having differing benefit accrual rates (and resulting pension amounts) for different groups of employees results in additional administrative costs as well as the necessity for clear and consistent communication about the benefits provided. There is also a potential equity issue when two employees, one hired before the change and one after, have the exact same job but have different pension benefits. Please note this situation already exists in PSERS and SERS.

DB Compensation Limit

The wording of the DB Compensation Limit definition is slightly different between PSERS and SERS, which could result in slightly different limits in future years due to the interaction of the 1% increases and the rounding to the nearest $100. We recommend that this wording be made consistent between the Systems to avoid different limits in future years.

Shared-Risk Contribution for Class T-G and A-5 members

Class T-G and A-5 members would also be subject to the shared-risk contributions currently applicable to Class T-E, T-F, A-3, and A-4 members, but only on compensation up to the DB Compensation Limit and only up to 25 years of service. Please note that we suggest the language for Class T-G members be expanded to clarify that shared risk contributions would cease upon completion of 25 years of service. §8321(b) states that "The total member contribution rate for Class T-G members shall not be less than 6% nor

more than 8%", which would only be true for the member's first 25 years of service. There is no corresponding sentence in excess of 25 years of service.

New Member Benefit Adequacy

Depending on the level of employer contributions, projected retirement benefits expected to be received by members are typically lower when a portion of a traditional final average pay retirement plan is replaced with a defined contribution plan. Most notably, the expected reduction in retirement benefits significantly impacts members who enter the system at older ages since the time available to accumulate substantial account balances is limited. In a traditional final average pay plan, the value of the retirement benefit increases significantly as members approach retirement and past years of service are based on current higher earnings. While this legislation continues the traditional final average pay plan but with limits on service and compensation, the addition of the defined contribution plan provides that benefits are earned more equitably over the working lifetime of a participant. Therefore, there is generally a decrease in the projected retirement benefits, depending on the relationship between past salary increases, the applicable DB Compensation Limit, and the investment income earned on the defined contribution accounts.

It was beyond the scope of our assignment to provide a comparison of the two benefit designs and the value to members. We note that each system's actuary provided some benefit comparisons in the cost estimates referenced below. Readers should keep in mind the reduction in the employee contribution rate from 7.5% for Class T-E members to 7% for Class T-G members and the increase in the employee contributions rate from 6.25% for Class A-3 members to 7% for Class A-5 members for the combined defined benefit/defined contribution plan. Due to the reduction, a PSERS member would have the choice to increase personal savings and this choice should also be considered in the benefit comparison as part of the three-legged stool of retirement savings. The opposite is true for a SERS member. Serious consideration should be given to having a formal analysis prepared prior to any revision in benefits. Such analysis should reflect the impact of varying investment returns and annuity conversion rates. In addition, if the pension benefits are reduced, there may be pressure to increase other forms of compensation to provide for the same level of total compensation value as before.

Determination of Employer Cost for SERS and PSERS under the Amendment

Funding of the two Systems is currently based on the determination of the employer normal cost and an amortization charge attributable to unfunded liabilities, all subject to contribution collars. The employer contribution is expressed as a percentage of active

member payroll (i.e. appropriation payroll) and charged to the various employers. Additionally, under current law governing PSERS and SERS, the normal cost of the system is to reflect the cost of benefits provided to the average new member of the retirement system. However, the systems have interpreted the statute differently regarding the method used to determine the normal cost.

SERS Normal Cost interpretation

Under the SERS interpretation, the normal cost for SERS would decrease upon enactment of this Amendment. However, the decrease is not due to the changes in benefits for current members, but rather due to the changes in benefits from future Class A-3 to future Class A-5 members. Because benefits provided to current members would be significantly higher than the benefits provided to members of the new Class A-5, the employer normal cost under SERS would be significantly lower than the average cost of the benefits provided to current members.

If this Amendment is enacted, SERS' actuary would base the normal cost calculation on new members in Class A-5 because the average new general employee member would enter this class. As a result, there would be a significant increase in the unfunded actuarial accrued liability attributable to this Amendment. This would occur because reducing the benefit accrual rate for only the average new members would not affect the present value of benefits for current members, but would reduce the future normal costs payable on account of these current members. Since the actuarial accrued liability is the difference between the total present value of benefits for all members and the present value of future normal costs, decreasing the normal cost for current members would generate an offsetting increase in the actuarial accrued liability. This approach is known as "Ultimate Entry Age Normal" and is a non-recommended practice as stated in a white paper published by the Conference of Consulting Actuaries for funding public pension systems (please see page 16 on the attached https://www.ccactuaries.org/Portals/0/pdf/CCA_PPC_White_Paper_on_Public_Pension_Funding_Policy.pdf). We concur with the White Paper and do not believe this approach is preferable for determining costs under a tiered system.

Furthermore due to the required calculations under GASB 67, an alternative version of the Entry Age Normal cost method (under which a normal cost is calculated for each member based on that member's benefit tier) must be used for employer accounting purposes. For this hybrid plan, we recommend that the Entry Age Normal method used for PSERS also be used for SERS.

Furthermore, under the Amendment, new State Police and, if Amendment A06888 is enacted, certain other new hazardous duty members would continue to receive benefits under Class A-3 and, if elected, A-4. The normal costs for these members would also be significantly higher than the normal costs for Class A-5 members. Thus when a new State Police or certain other hazardous duty member enter SERS, an immediate actuarial loss occurs increasing the actuarial accrued liability due to the mismatch in the normal cost rate. This actuarial loss is then amortized over 30-years which is most likely longer than the total working lifetime of the majority of these members. We recommend that the normal cost at least reflect a weighted average of all new entrants, including State Police and, if applicable, certain other hazardous duty members, but we strongly recommend that normal costs be determined explicitly for each member based on that member's tier of benefits.

SERS Accrued Liability Contribution Rate and Experience Adjustment Factor

As indicated above, the actuarial loss associated with the mismatch between normal cost rates for current members and new members entering the System who are not Class A-5 results in a potentially perpetual stream of annual losses that would each be amortized over a 30-year period. This 30-year period is in all likelihood greater than the expected working lifetime of the active member, thus, the actuarial loses incurred during the working lifetime continues to be amortized beyond the period of employment. We would recommend a shorter amortization period for actuarial losses incurred if the SERS normal cost method continues to be utilized. In addition, we would also recommend shorter periods be used for all actuarial gains or losses for both systems (e.g. 15-20 years, but no more than a period in which the first year payment is greater than the expected interest on the payment to prevent negative amortization, rather than the 24 years used by PSERS and 30 years used by SERS).

PSERS Normal Cost interpretation

Under the PSERS interpretation of the statute, the normal cost rate reflects the actual Class of membership of each active member. This is the traditional way to calculate the normal cost under the entry age cost method. We understand that PSERS' actuary develops a normal cost rate based on current active members and the benefits to which each member is entitled. Thus, the PSERS normal cost rate is based on an average of each member reflecting the 2.0% and 2.5% benefit accrual rates and the various member contribution rates, depending on each member's date of hire and class of service. As a result, the PSERS normal cost rate will gradually decline as current members leave active service and are replaced by new members in Class T-G. As a result, the unfunded accrued liability for current members would not change due to this Amendment. The

Amendment would codify this interpretation of the PSERS normal contribution rate determination effective for the fiscal year beginning on July 1, 2016.

We believe that the normal cost determined for both PSERS and SERS should reflect the prospective benefits to be earned by the members in the System as of the valuation date, which is more consistent with PSERS' method. As noted above, this is especially important if the reduced benefit classes are adopted for new members, in order to avoid having a large decrease in the normal cost for current members and a corresponding increase in the actuarial accrued liability that is then funded over a longer period. We strongly recommend that this approach be used by SERS as well.

Normal Cost for Class T-G and A-5 members

For Class T-G and A-5 members, the normal contribution rate is to be determined as a level percentage of compensation up to the DB Compensation limit for only such members with less than 25 years of service. However the Amendment indicates the percentage is "contributed on the basis of the member's prospective compensation through the entire period of active service" in the normal contribution rate determination. While the definition indicates that limited compensation is to be reflected for these members, the statutory language is ambiguous on whether only the first 25 years of service should be reflected in the normal contribution rate determination. Since members with 25 or more years of service would be excluded from the normal contribution rate determination, we believe such limitation should be reflected. Please note that Hay reflected this limitation in the SERS analysis, but Buck did not reflect it in the PSERS analysis. This results in a different pattern of employer contribution dollars and thus a difference in the timing of employer contribution savings. We recommend that the language be clarified and adjustments to the actuarial cost notes be reflected, if needed, prior to the Amendment's enactment, such that a consistent methodology is used for each System.

Payroll for Employer Contribution Rate

Currently, the employer contribution rate applies to all active member payroll. With this amendment, there would be different employer contribution rates applied to different subsets of active member and active participant payroll as indicated in the table below.

Payroll	Employer Contribution Rate
Legacy DB member (i.e. not Class T-G/A-5 members)	• Normal contribution rate • Accrued liability contribution rate • Premium assistance contribution rate (PSERS)
Class T-G/A-5 member payroll under DB Compensation Limit for members with less than 25 years of service	• Normal contribution rate • Accrued liability contribution rate • Premium assistance contribution rate (PSERS) • 0.5% DC contribution
Class T-G/A-5 member payroll above DB Compensation Limit for members with less than 25 years of service and all payroll for members with 25 or more years of service	• Accrued liability contribution rate • 4% DC contribution

Please note that Buck's cost estimates for PSERS utilizes total compensation for all members in determining the contribution rates. Although we do not believe that the use of total compensation resulted in a different estimate of contribution dollars, we recommend that the drafters of this Amendment discuss with PSERS the most administratively feasible approach to determine the contribution dollars to be made to the System while maintaining the Amendment's intent.

Use of Plan Savings

§8406.1 and §5806.1 indicate that it is the General Assembly's intent to make an annual appropriation from the General Fund to the Systems equal to the difference between the current aggregate employer contributions and the aggregate employer contribution that would have been required by Act 120-2010. Neither cost note by the System actuaries incorporated this provision due to the uncertainty on how the calculation was to be determined. We recommend that a measurement of plan savings be explicitly defined prior to the Amendment's enactment, with subsequent estimates of the annual appropriation amounts that could be expected.

Alternative Retirement Plan such as TIAA-CREF

Certain public employees hired by state or school employers within the Commonwealth have the opportunity to waive membership in SERS / PSERS and elect an alternative retirement plan such as TIAA-CREF. Since the benefits provided by the alternative retirement plans are not changing, it is possible more eligible members may elect an

alternative plan over Class T-G or A-5 membership. If eligible new employees elect an alternative retirement plan, the anticipated membership within SERS and PSERS could slowly decline, impacting the appropriation payroll which could lead to increases in the employer unfunded liability rate, although not necessarily the dollar amount of the unfunded liability.

Review of Estimated Actuarial Cost Prepared by System Actuaries

You provided us with a copy of the May 10, 2016 estimates by Buck Consultants for PSERS and the May 11, 2016 estimates by Hay Group for SERS with the projected impact of this Amendment and, for SERS, Amendment A06888. Please note that we were not provided with the additional supplementary information that would allow us to provide a more in-depth review in time for this cost note. If a more in-depth review could be conducted, our comments may differ.

While the Amendment contains effective dates in 2017, the Systems' have indicated that the 2017 effective dates are impractical, and the System actuaries' cost estimates assume the effective dates would be revised to July 1, 2018 and January 1, 2018, respectively, prior to enactment of the Amendment.

The cost estimates include multi-year projections of the employer contribution rate under the current law and if this Amendment, including amendments, was enacted. These estimates show the projected appropriation payroll and the employer contribution rate for the System as well as for the defined contribution plan portion of the hybrid plan. These projections are based on the latest actuarial valuations (June 30, 2015 for PSERS and December 31, 2015 for SERS, although the SERS valuation report has not yet been released), and assume that future experience will exactly match the actuarial assumptions used to prepare the valuation and projections.

The multi-year projections reflect a single deterministic scenario assuming that all assumptions are exactly realized, including actual investment return on the market value of assets of 7.5% each and every year. In reality, actual investment returns will vary from year to year, which will have an impact on the future employer and member costs. Due to the scope and impact of this Amendment, we strongly recommend and feel it is most prudent that stochastic modeling be performed to analyze the impact of varying investment returns on the future employer costs, especially due to the transfer of risk due to the DC plan component and the fact that member contributions are impacted by varying investment returns via the shared-risk provisions.

The following represents Milliman's additional commentary on Buck's analyses for the Amendment's impact on PSERS:

- The effective date used in the analysis was one year later than that included in the Amendment, July 1, 2018 versus July 1, 2017. There was no mention in the analysis regarding the possibility that the holding vehicle trust could assist with potential transition issues. Since the Amendment produces savings over the projection periods, the effective date included in the Amendment would be expected to produce savings beginning one year earlier than the modified effective date assumed in Buck's analysis.
- Buck's June 30, 2015 actuarial valuation stated "we believe that it would be inappropriate to claim that the annuitant mortality assumption now in use incorporates a provision for improvements in longevity beyond the measurement date". If such provisions were made and included in these projections, the expected contributions to PSERS would increase under current provisions and would also increase, but to a lesser extent, under this Amendment due to a partial shifting of costs and benefits to a defined contribution plan. Since longevity risk in a defined contribution plan is borne by the participant, there would be no employer cost impact to this portion of the benefit. Therefore, we would expect the savings of the hybrid plan to increase (and the expected benefit levels provided by the defined contribution plan to decrease since they would be expected to cover a longer lifetime).
- Buck assumes that employees who became members of PSERS during the period July 1, 2012 through June 30, 2015 would be representative of members entering the system each year in the future. Based on our understanding of Buck's projection methodology, the new entrant cohort, which contains a mix of full-time and part-time members, replaces both full-time and part-time members who are expected to leave service. We note that we would expect the level of future full-time and part-time membership to remain constant over a projection period such that new full-time members are replacing exiting full-time members and new part-time members are replacing exiting part-time members. If there is a greater proportion of part-time members relative to full-time members in the cohort versus the current population, the projections would lead to a different blend of full-time versus part-time membership over time. We recommend that the System and Buck review the methodology of the new entrant projection and the projection of future full-time versus part-time members to determine if it is representative of the expected ratio of long-term future membership of full-time versus part-time members.
- No provision was made to reflect the "Use of Plan Savings" section.

The following represents Milliman's additional commentary on Hay Group's analysis of the Amendment's impact on SERS:

- The effective date used in the analysis was one year later than that included in the Amendment, January 1, 2018 versus January 1, 2017. There was no mention in the analysis regarding the possibility that the holding vehicle trust could assist with potential transition issues. Since the Amendment produces savings over the projection periods, the effective date included in the Amendment would be expected to produce savings beginning one year earlier than the modified effective date assumed in Hay's analysis.
- In Hay's 2015 experience study, the mortality assumption was updated to reflect a 10% margin, otherwise known as a static approach to mortality improvement in future years. As they indicated in the experience study, they preferred this approach rather than applying a generational ("built-in") mortality improvement scale. Although a static approach may be appropriate for a single valuation, the margin would be expected to decrease or be eliminated in the future valuations performed over the 30-year projection period as provided for in this analysis. If improvements in mortality were included in the projections beyond the current margins, the expected contributions to SERS would increase under current provisions and would also increase, but to a lesser extent, under this Amendment due to a partial shifting of costs and benefits to a defined contribution plan. Since longevity risk in a defined contribution plan is borne by the participant, there would be no employer cost impact to this portion of the benefit. Therefore, we would expect the savings of the hybrid plan to increase (and the expected benefit levels provided by the defined contribution plan to decrease since they would be expected to cover a longer lifetime).
- No provision was made to reflect the "Use of Plan Savings" section.

The PSERS estimate of this Amendment included the year-by-year cash flow cost/(savings) and the present value of such cash flow cost/(savings) using the System's investment return assumption of 7.5% over the projection period. The present value reflects the time value of money. The interest rate used to discount any savings would vary based on the user's perspective. The Commonwealth may want to use an inflation rate consistent with budget growth as increases in costs above that rate decrease available dollars for other programs in future years, excluding any new revenue. The System would probably wish to use its expected return since that would be consistent with the development of its costs and liabilities.

If this Amendment, with or without Amendment A06888, is enacted, the following chart shows the expected accumulated nominal dollar cash flow costs/(savings) on the employer contributions for the fiscal years 2016-2017 through 2048-2049 as provided by

the System actuaries. It is important to note that Hay displayed contributions through the 2051-2052 fiscal year for SERS and thus, the numbers shown below will differ from the totals reported by Hay in order to provide costs that are consistent with the period reported by Buck for PSERS.

The chart also shows the present value of the expected cash flow costs/(savings) as of June 30, 2016, assuming end of year payment, at 3.9% (a proxy for budget growth) and 7.5% (the current investment return for the Systems). The 3.9% proxy for budget growth is based on the annual growth in estimated general fund revenue from 2017-2018 to 2019-2020 shown on page C1-12 in the Governor's Executive Budget for 2015-2016.

Impact on Employer Contributions if Amendment A06859
to House Bill 727, PN 1555 is enacted
For Fiscal Years 2016-2017 through 2048-2049
(Amounts in millions and based on System actuary's projections; any provision for use of plan savings is not included in these projections)

	Cash Flow Costs / (Savings) as determined by System Actuary	Present Value of Cash Flow Costs / (Savings) at 3.9% as of June 30, 2016	Present Value of Cash Flow Costs / (Savings) at 7.5% as of June 30, 2016
Without Amendment A06888			
PSERS	$(4,025.2)	$(1,732.6)	$(870.0)
SERS	(5,918.5)	(2,440.7)	(1,199.2)
Total	(9,943.7)	(4,173.3)	(2,069.2)
With Amendment A06888			
PSERS	$(4,025.2)	$(1,732.6)	$(870.0)
SERS	(5,734.3)	(2,361.5)	(1,158.8)
Total	(9,759.5)	(4,094.1)	(2,028.8)

The above chart reflects the 2018 effective dates reflected in the System actuaries' estimates. If the 2017 effective dates in the Amendment were reflected instead, an additional year of savings would be expected to be reflected during the projection period; however such savings would be offset by the cost of the Commonwealth's guaranteed

4% return on DC contributions prior to the establishment of the DC plan trust and any additional administrative expenses for the DC plan trust during the interim period.

For the projections of the Amendment's impact, the actuaries of both systems continued to use the same actuarial assumptions adopted for use in the latest valuations. In particular, the current actuarial assumptions utilized for PSERS for early retirement was developed with members having the ability to obtain a subsidized early retirement benefit. The early retirement subsidies are not available to Class T-G members and thus we would expect the rate of early retirement to decline for these members. Although experience would not be known for Class T-G members for many years, it may be more appropriate to make an assumption regarding possible adjustments to the early retirement rates rather than maintaining the current early retirement rates.

Please note that the actual cost of this Amendment, if enacted, would depend on the actual experience for the new Class T-G in PSERS and the new Class A-5 in SERS. The actual costs could be higher or lower. It may be appropriate to review alternative assumptions for the new benefit classes.

Each of the system's assets is assumed to earn 7.5% each year of the projection. To the extent adverse (favorable) investment returns are experienced, the contribution rates would be higher (lower). Due to the transfer of investment risk to the participants in the DC portion of the hybrid plan, we would expect the employer cost impact of investment gains/losses would be greater under the current plan than under the hybrid plan approach contained in the Amendment.

Basis for Analysis

In performing this analysis, we have relied on the information provided by the Commission, PSERS, SERS, Buck Consultants, and Hay Group. We have not audited or verified this data and other information. If the data or information is inaccurate or incomplete, the results of this analysis may likewise be inaccurate or incomplete.

We performed a limited review of the projections prepared by Buck Consultants and Hay Group as provided by the Commission, PSERS, and SERS for reasonableness and consistency and, except as described above, have not found material defects. If there are material defects, it is possible that they would be uncovered by a detailed, systematic review and comparison to search for values that are questionable or for relationships that are materially inconsistent. Such a review was beyond the scope of our assignment.

Future actuarial measurements may differ significantly from the current measurements presented in this analysis due to actual plan experience deviating from the actuarial assumptions, the natural operation of the plan's actuarial cost method, and changes in plan provisions, actuarial assumptions, actuarial methods, and applicable law. An assessment of the potential range and cost effect of such differences is beyond the scope of this analysis.

Milliman's work is prepared solely for the internal business use of the Pennsylvania Public Employee Retirement Commission. To the extent that Milliman's work is not subject to disclosure under applicable public records laws, Milliman's work may not be provided to third parties without Milliman's prior written consent. Milliman does not intend to benefit or create a legal duty to any third party recipient of its work product. Milliman's consent to release its work product to any third party may be conditioned on the third party signing a Release, subject to the following exception:

- The Commissions may provide a copy of Milliman's work, in its entirety, to other governmental entities, as required by law.

No third party recipient of Milliman's work product should rely upon Milliman's work product. Such recipients should engage qualified professionals for advice appropriate to their own specific needs.

The consultants who worked on this assignment are pension actuaries. We have not explored any legal issues with respect to the proposed plan changes. We are not attorneys and cannot give legal advice on such issues. We suggest that you review this proposal with counsel.

We are members of the American Academy of Actuaries and meet its Qualification Standards to render this actuarial opinion.

Please let us know if we can provide any additional information regarding this Amendment.

Sincerely,

Timothy J. Nugent

Scott F. Porter

Katherine A. Warren

TJN:SFP:KAW\78RSC01-59
g:\corr\2016\rsc\ltr05_A06859toHB727_StackedHybridforNew(Tobash).docx

Conference of Consulting Actuaries
Public Plans Community (CCA PPC)

Actuarial Funding Policies and Practices for Public Pension Plans

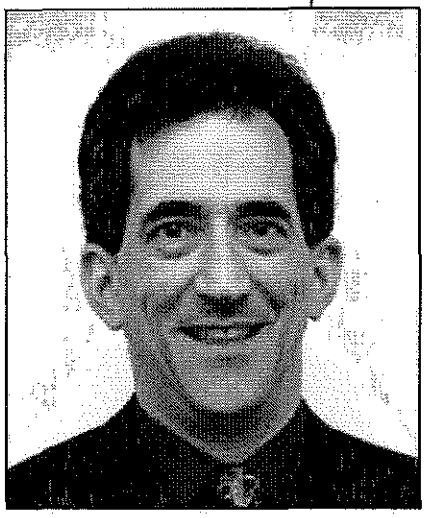
October 2014

Advancing the Practice®

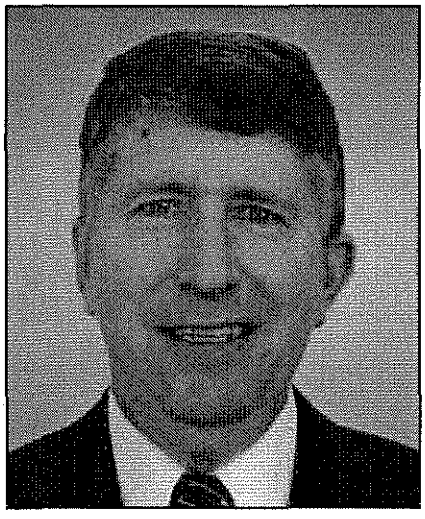
Conference of Consulting Actuaries

Public Plans Community

Contents



Paul Angelo



Tom Lowman

An Open Letter

From: Paul Angelo, Chair and Tom Lowman, Vice Chair Conference of Consulting Actuaries Public Plans Community

To: Interested Parties in the Public Pension Arena

Re: Public Plans Community White Paper on Public Pension Funding Policy

On behalf of the Conference of Consulting Actuaries' Public Plans Community (CCA PPC), the following "White Paper" is presented to provide guidance to policymakers and other interested parties on the development of actuarially based funding policies for public pension plans. The CCA PPC includes over 50 leading actuaries whose firms are responsible for the actuarial services provided to the majority of public-sector retirement systems in the US. All of the major actuarial firms serving the public sector are represented in the CCA PPC as well as in-house actuaries from several state plans. As a result, the CCA PPC represents a broad cross section of public-sector actuaries with extensive experience providing valuation and consulting services to public plans, and it is that experience that provides the knowledge base for this paper.

The White Paper is based on over two years of extensive and detailed funding policy discussions among the members of the CCA PPC, and reflects the experience of those members in providing actuarial consulting services to state and local public pension plans throughout the US. While there were naturally disagreements and compromises during those discussions, the White Paper reflects the resulting majority opinions of the CCA PPC as developed through those discussions. We believe this White Paper reflects a substantial consensus among the actuaries who provide valuation and consulting services to public pension plans.

This White Paper represents groundbreaking actuarial research in that it develops a principles based, empirically grounded Level Cost Allocation Model (LCAM) for use as a basis for funding policies for public pension plans throughout the US. In particular, we believe that the funding policies developed herein could serve as a rigorously defensible basis for an "actuarially determined contribution" under Statements 67 and 68 of the Governmental Accounting Standards Board.

The distinguishing feature of this approach is that it is begins with stated policy objectives and then develops specific policy guidance consistent with those objectives. One of the main results is that an effective funding policy often represents a balancing of policy objectives. Another is that adherence to the policy objectives may lead to a narrower range of acceptable practices than is sometimes found in current practice.

The LCAM White Paper is intended to provide guidance not just in the evaluation of particular current policy practices but also in the development of actuarially based funding policies in a consistent and rational manner. For that reason, the reader is strongly encouraged to focus not only on the specific practice guidance but also on the detailed discussions and rationales that lead to that guidance. Also note that while this discussion is comprehensive it is not all-inclusive. There is a list of "items for future discussion" at the end of the paper. In addition, there may be other "level cost allocation models" that are appropriate in some circumstances.

The CCA PPC would like to acknowledge and thank the California Actuarial Advisory Panel for their seminal work in developing the principles-based level cost allocation model on which this White Paper is based. We also thank all the members of the Conference of Consulting Actuaries Public Plans Community who helped in the development of this paper.

Introduction

This "white paper" is based on funding policy discussions among the members of the Conference of Consulting Actuaries Public Plans Community (CCA PPC) and reflects the majority opinions the CCA PPC members[1]. Those discussions relied heavily upon and generally concurred with the funding policy white paper prepared by the California Actuarial Advisory Panel (CAAP) and the level cost allocation model developed therein[2]. For that reason, the CCA PPC has chosen to build directly on the CAAP document in developing its own funding policy guidance.

The CCA PPC wishes to express its sincere appreciation to the CAAP for its seminal work in preparing a principles-based funding policy development. However, while much of the text of this CCA PPC white paper comes directly from the CAAP document, this white paper is presented solely as the majority opinions of the CCA PPC.

This CCA PPC white paper is intended for a national audience, as part of a nation-wide review and discussion of funding policies for public pension plans. Our hope is that the principles and policies developed herein may provide an actuarial basis for others developing funding practices and that legislative, regulatory and other industry groups may build these concepts into their guidance.

This white paper develops the principal elements and parameters of an actuarial funding policy[3] for US public pension plans. It includes the development of a Level Cost Allocation Model (LCAM) as a basis for setting funding policies. This white paper does not address policy issues related to benefit plans where a member's benefits are not funded during the member's

---

1 These comments were developed through the coordinated efforts of the Conference of Consulting Actuaries' (CCA) Public Plans Steering Committee. However, these comments do not necessarily reflect the views of the CCA, the CCA's members, or any employers of CCA members, and should not be construed as being endorsed by any of those parties.

2 See "Actuarial Funding Policies and Practices for Public Pension and OPEB Plans and Level Cost Allocation Model" at http://www.sco.ca.gov/caap_resources.html

3 As used in this paper, an "actuarial funding policy" has the same meaning as a "Contribution Allocation Procedure" as defined in the Actuarial Standards of Practice (ASOPs). We further note that the actuarial policies that determine the level and timing of contributions must also include policies related to setting the actuarial assumptions. As noted at the end of this section, this paper does not address policies and practices related to setting actuarial assumptions.

working career, e.g., plans receiving "pay-as-you-go" funding or "terminal" funding.

While this white paper develops guidance primarily for pension plans, we believe the general policy objectives presented here are applicable to the funding of OPEB plans as well. However, application of those policy objectives to OPEB plans may result in different specific funding policies based on plan design, legal status and other features distinctive to OPEB plans. We encourage those involved in the valuation and funding of OPEB plans to consider the applicability to those plans of the policy guidance developed here.

Some pension plans have contributions rates that are set on a fixed basis, rather than being regularly reset to a specific, actuarially determined rate. The CCA PPC believes that such plans should develop an actuarially determined contribution rate for comparison to the fixed rate. However, this white paper does not address procedures for evaluating that comparison, or for determining whether the fixed rate is sufficient or when and how the fixed rate should be changed. The CCA PPC intends to prepare a separate white paper on fixed rate plans including these considerations.

As developed here the LCAM is a level cost actuarial methodology[4], which is consistent with well-established actuarial practice. The LCAM is a principles-based mathematical model of pension cost. The model policy elements are developed in a logical sequence based on stated general policy objectives, and in a manner consistent with primary factors that affect the cost of the pension obligation.

The particular model that we develop is based on a combination of policy objectives and policy elements that has been tested over many years and, we believe, is well understood and broadly applicable. However, there are other models and policy objectives that practitioners may use that are internally consistent and may be as appropriate in some circumstances as the model that is developed herein, and it is not our intention to discourage consideration of such other policies[5]. Furthermore, there are situations where the policy parameters developed herein may require additional analysis to establish the appropriate parameters for each such situation[6]. It is up to the actuary to apply professional judgment to the particulars of the situation and recommend the most appropriate policies for that situation, including considerations of materiality.

Our approach begins with identifying the policy objectives of such a funding policy, and then evaluating the structure and parameters for each of the particular policy elements in a manner consistent with those objectives, as well as with current and emerging actuarial science and governing actuarial standards of practice.

This white paper is intended as advice to actuaries and retirement boards[7] in the setting of funding policy. While the analysis is somewhat restrictive in the categorization of practices, this guidance is not intended to supplant or replace the applicable Actuarial Standards of Practice (ASOPs). Like all opinions of the CCA PPC, this guidance is nonbinding and advisory only. Furthermore, it is not intended as a basis for litigation, and should not be referenced in a litigation context.

Given the wide range of such policies currently in practice in the U.S., this development also acknowledges that plan sponsors and retirement boards may require some level of policy flexibility

---

4 Here a "level cost actuarial methodology" is characterized by economic assumptions based on the long term expected experience of the plan and a cost allocation designed to produce a level cost over an employee's active service. This is in contrast to a "market-consistent" actuarial methodology where economic assumptions are based on observations of current market interest rates, and costs are allocated based on the (non-level) present value of an employee's accrued benefit.

5 In particular, the LCAM developed here incorporates the widely prevalent practice of managing asset volatility directly through the use of an asset smoothing policy element. Some practitioners are developing direct contribution rate smoothing techniques as an alternative to asset smoothing. The CCA PPC is considering development of a separate white paper on direct smoothing as an alternative to asset smoothing.

6 For example, plans that are closed to new entrants may require additional analyses and forecasts to determine whether the policy parameters herein provide for adequate funding.

7 Here "retirement boards" is meant to refer generally to whatever governing bodies have authority to set funding policy for public sector plans.

to reflect both their specific policy objectives and their individual circumstances. To accommodate that need for reasonable flexibility and yet also provide substantive guidance, this development evaluates various policy element structures and parameters or ranges according to the following categories:

- LCAM Model practices (i.e., practices most consistent with the LCAM developed herein)
- Acceptable practices
- Acceptable practices, with conditions
- Non-recommended practices
- Unacceptable practices.

These categories are best understood in the context of the different elements that comprise an actuarial funding policy and the various policy alternatives for each of those policy elements. They are intended to assist in the evaluation of specific policy elements and parameters relative to the general policy objectives stated herein, and are developed separately for each of the three principal policy elements discussed in this white paper (cost methods, asset smoothing methods and amortization policy). They are not intended as a grading or scoring mechanism for a system's overall actuarial funding policy.

Generally, throughout this discussion, "model practices" means those practices most consistent with general policy objectives and the LCAM as developed here based on those policy objectives[8]. Acceptable practices are generally those that while not fully consistent with the LCAM as developed here, are well established in practice and typically do not require additional analysis to demonstrate their consistency with the general policy objectives. Practices that are acceptable with conditions may be acceptable in some circumstances, on the basis of additional analysis to show consistency with the general policy objectives or to address risks or concerns associated with the practices. Systems that adopt practices that under this model analysis are not recommended should consider doing so with the understanding that they reflect policy objectives different from those on which this LCAM is based or should consider the policy concerns identified herein.

This evaluation of practice elements and parameters was developed in relation to the LCAM and its general policy objectives, based on experience with the many independent public plans sponsored by states, counties, cities and other local public employers in the US, and is intended to have general applicability to such plans. However, for some plans, special circumstances or situations may apply. The specific applicability of the results developed here should be evaluated by their governing boards based on the advice of their actuaries.

Note that while the selection of actuarial assumptions is an essential part of actuarial policy for a public sector pension plan, the selection of actuarial assumptions is outside the scope of this discussion. For example, a pension plan should perform a comprehensive review of both economic and demographic assumptions on a regular basis as part of its actuarial policies. Another important consideration in determining a plan's funding requirements is the plan's investment policy and related investment portfolio risks. While actuarial assumptions, plan investments and even benefit design are all elements that affect funding requirements, they are beyond the scope of this paper.

This white paper is also not intended to address the measurement of liabilities for purposes other than funding, e.g., settlement obligations or other market-consistent measures[9].

Finally note that some retirement systems have features that may require funding policy provisions and analyses that are not specifically addressed herein. One example is systems with "gain sharing" provisions whereby favorable investment experience is used as the basis for increasing member benefits and/or reducing employer and/or member contributions. The policies developed here should not be interpreted as being adequate to address these plan features without additional analysis specific to those features.

---

8 Some commentators have interpreted "model practices" as synonymous with "best practices." That is not the intent of this categorization of practices. Given their circumstances retirement boards may find that other practices, particularly those categorized and acceptable or acceptable with conditions, are considered both appropriate and reasonably consistent with the policy objectives stated herein.

9 See footnote 4

Transition Policies

In order to avoid undue disruption to a sponsor's budget, it may not be feasible to adopt policies consistent with this white paper without some sort of transition from current policies. For example, a plan using longer than model amortization periods could adopt model periods for future unfunded liabilities while continuing the current (declining) periods for the current unfunded liabilities. Such transition policies should be developed with the advice of the actuary in a manner consistent with the principles developed herein. We have included in our discussion transition policies appropriate to each of the principal policy elements.

General Policy Objectives

The following are policy objectives that apply generally to all elements of the funding policy. Objectives specific to each principal policy element are identified in the discussion of that policy element.

1. The principal goal of a funding policy is that future contributions and current plan assets should be sufficient to provide for all benefits expected to be paid to members and their beneficiaries when due.
2. The funding policy should seek a reasonable allocation of the cost of benefits and the required funding to the years of service (i.e. demographic matching). This includes the goal that annual contributions should, to the extent reasonably possible, maintain a close relationship to the both the expected cost of each year of service and to variations around that expected cost.
3. The funding policy should seek to manage and control future contribution volatility (i.e., have costs emerge as a level percentage of payroll) to the extent reasonably possible, consistent with other policy goals.
4. The funding policy should support the general public policy goals of accountability and transparency. While these terms can be difficult to define in general, here the meaning includes that each element of the funding policy should be clear both as to intent and effect, and that each should allow an assessment of whether, how and when the plan sponsor is expected to meet the funding requirements of the plan.
5. The funding policy should take into consideration the nature of public sector pension plans and their governance. These governance issues include (1) agency risk issues associated with the desire of interested parties (agents) to influence the cost calculations in directions viewed as consistent with their particular interests, and (2) the need for a sustained budgeting commitment from plan sponsors.

Policy objective 1 means that contributions should include the cost of current service plus a series of amortization payments or credits to fully fund or recognize any unfunded or overfunded past service costs (note that the latter is often described as "Surplus").

Policy objectives 2 and 3 reflect two aspects of the general policy objective of interperiod equity (IPE). The "demographic matching" goal of policy objective 2 promotes intergenerational IPE, which seeks to have each generation of taxpayers incur the cost of benefits for the employees who provide services

to those taxpayers, rather than deferring those costs to future taxpayers. The "volatility management" goal of policy objective 3 promotes period-to-period IPE, which seeks to have the cost incurred by taxpayers in any period compare equitably to the cost for just before and after.

These two aspects of IPE will tend to move funding policy in opposite directions. Thus the combined effect of policy objectives 2 and 3 is to seek an appropriate balance between intergenerational and period-to-period IPE, that is, between demographic matching and volatility management.

Policy objective 3 (and the resulting objective of balancing policy objectives 2 and 3) depends on the presumed ongoing status of the public sector plan and its sponsors. The level of volatility management appropriate to a funding policy may be less for plans where this presumption does not apply, e.g., plans that are closed to new entrants.

Policy objective 4 will generally favor policies that allow a clear identification and understanding of the distinct role of each policy component in managing both the expected cost of current service and any unexpected variations in those costs, as measured by any unfunded or overfunded past service costs. Such policies can enhance the credibility and objectivity of the cost calculations, which is also supportive of policy objective 5.

Policy objective 5 seeks to enhance a retirement board's ability to resist and defend against efforts to influence the determination of plan costs in a manner or direction inconsistent with the other policy objectives. This favors policies based on a cost model where the parameters are set in reference to factors that affect costs rather than the particular cost result. This separation between the selection of model parameters and the resulting costs enhances the objectivity of the cost results. As a result, any attempt to influence those results must address the objective parameters rather than the cost result itself.

A common example of agency risk is that, because plan sponsors may be more aware of and responsive to the interests of current versus future taxpayers, there may be incentives to defer necessary contributions to future periods. This may be countered by avoiding policy changes that selectively reduce contributions.

For plans with an ongoing service cost for active members, policy objective 5 also reflects a policy objective to avoid encumbering for other uses the budgetary resources necessary to support that ongoing service cost. This introduces an asymmetry between funding policies for unfunded liabilities versus surpluses, which is discussed in the policy development for surplus amortization.

Note that the model funding policies developed here are substantially driven by these policy objectives. In some situations other plan features or policies (e.g., investment policy, reserving requirements, and plan maturity) may also be a consideration in setting funding policy. Such considerations are not addressed in this analysis.

Principal Elements of Actuarial Funding Policy

The type of comprehensive actuarial funding policy developed here is made up of three components:

1. An **actuarial cost method**, which allocates the total present value of future benefits to each year (Normal Cost) including all past years (Actuarial Accrued Liability or AAL).
2. An **asset smoothing method**, which reduces the effect of short term market volatility while still tracking the overall movement of the market value of plan assets.
3. An **amortization policy**, which determines the length of time and the structure of the increase or decrease in contributions required to systematically (1) fund any Unfunded Actuarial Accrued Liability or UAAL, or (2) recognize any Surplus, i.e., any assets in excess of the AAL.

An actuarial funding policy can also include some form of "direct rate smoothing" in addition to both asset smoothing and UAAL/Surplus amortization. Two types of this form of direct rate smoothing policies were evaluated for this development:

1. Phase-in of certain extraordinary changes in contribution rates, e.g., phasing-in the effect of assumption changes element over a three year period.
2. Contribution "collar" where contribution rate changes are limited to a specified amount or percentage from year to year.

As noted earlier, it is also possible to use direct contribution rate smoothing techniques as an *alternative* to asset smoothing, rather than in addition to asset smoothing. While that approach is outside the scope of this discussion, the CCA PPC is considering development of a separate white paper on direct rate smoothing as an alternative to asset smoothing.

Actuarial Cost Method

The Actuarial Cost Method allocates the total present value of future benefits to each year (Normal Cost) including all past years (Actuarial Accrued Liability[1] or AAL).

Specific policy objectives and considerations

1. Each participant's benefit should be funded under a reasonable allocation method by the expected retirement date(s), assuming all assumptions are met.
2. Pay-related benefit costs should reflect anticipated pay at anticipated decrement.
3. The expected cost of each year of service (generally known as the Normal Cost or service cost) for each active member should be reasonably related to the expected cost of that member's benefit.
4. The member's Normal Cost should emerge as a level percentage of member compensation[2].
5. No gains or losses should occur if all assumptions are met, except for:
   a. Investment gains and losses deferred under an asset smoothing method consistent with these model practices, or
   b. Contribution losses or gains due to a routine lag between the actuarial valuation date and the date that any new contributions rates are implemented, or
   c. Contribution losses or gains due to the phase-in of a contribution increase or decrease.
6. The cost method should allow for a comparison between plan assets and the accumulated value of past Normal Costs for current participants, generally known as the Actuarial Accrued Liability (AAL).

---

1 Here "liability" indicates that this is a measure of the accrued (normal) cost while "actuarial" distinguishes this from other possible measures of liability: legal, accounting, etc.

2 This objective applies most clearly to benefits (like, for example, most public pension benefits) that are determined and budgeted for as a percentage of individual and aggregate salary, respectively. For benefits that are not pay related it may be appropriate to modify this objective and the resulting policies accordingly.

Discussion

1. Any actuarial cost model for retirement benefits begins with construction of a series or array of Normal Costs that, if funded each year, under certain stability conditions will be sufficient to fund all projected benefits for current active members. The following considerations serve to specify the cost model developed here.
   a. The usual stability conditions are that the current benefit structures and actuarial assumptions have always been in effect, the benefit structures will remain in effect, and future experience will match the actuarial assumptions. Special considerations apply if in the past the benefit structure has been changed for current active members changing the benefits for members with service after some fixed date.
   b. Consistent with Cost Method policy objective #3 and with the general policy objective of transparency, the Normal Cost for each member is based on the benefit structure for that member. This means that a separate Normal Cost array is developed for each tier of benefits within a plan. This argues against Ultimate Entry Age, where Normal Cost is based on an open tier of benefits even for members not in that open tier.
   c. Consistent with Cost Method policy objective #4, the Normal Cost is developed as a level percentage of pay for each member, so that the Normal Cost rate for each member (as a percentage of pay) is designed to be the same for all years of service. This provides for a more stable Normal Cost rate for the benefit tier in case of changing active member demographics. This argues against Projected Unit Credit.
   d. Also consistent with Cost Method policy objective #4, the Normal Cost for all types of benefits incurred at all ages is developed as a level percentage of the member's career compensation. This argues against funding to decrement. For plans with a DROP (Deferred Retirement Option Program) this also argues for allocating Normal Cost over all years of employment, including those after a member enters a DROP.
   e. Consistent with Cost Method policy objective #6, the Normal Cost is developed independent of plan assets, and the Actuarial Accrued Liability (and so also the UAAL) is based on the Normal Costs developed for past years. This argues against Aggregate and FIL as model practices.
      i. These methods should be considered as a fundamentally different approach to the determination and funding of variations from Normal Cost.
      ii. Plans using these methods should also measure and disclose costs and liabilities under the Entry Age method, similar to the requirements of current accounting standards.
   f. Historical practice includes the use of a variation of the Entry Age method (an "Aggregated" Entry Age method) where the Normal Cost and AAL are first determined for each member in a tier of benefits under the usual Entry Age method. However, the actual Normal Cost for the tier is then determined as the Normal Cost rate for the tier applied to the compensation for the tier, where the Normal Cost rate for the tier of benefits is determined as the present value of future Normal Costs for all active members in the tier, divided by the present value of compensation for all members in the tier.
      i. This variation introduces an inconsistency between the Normal Cost that is funded and the Normal Cost on which the AAL is based.
      ii. This inconsistency can be shown to produce small but systematic gains or losses, generally losses.

2. Consistent with all the above, under the cost model developed here the Normal Cost rate would change only when the projected benefits for the tier change either in amounts or in present value.

   a. The Normal Cost rate (both in total and by member) will vary from valuation to valuation due to demographic experience and assumption changes.

   b. The Normal Cost rate will not change when an individual member reaches an age or service where, under the consistent benefit structure for the member's tier, the member's benefit eligibility or accrual rate changes. This is because that event was anticipated in the projected benefits for the tier, so that the projected benefits are substantially unaffected by such predictable changes in eligibility or benefit accrual.

   c. Similarly the Normal Cost rate for a member should be unaffected by the closing of the member's tier and the creation of a new tier for future hires, as discussed under item 1.b above.

   d. However, if the benefit structure of a continuing, open tier is changed for members with service after some fixed date, then the Normal Cost rate should change to reflect the unanticipated change in projected benefits for members in the tier[3]. This calls for an extension or variation of the Entry Age method in order to value this type of benefit change.

      i. There are two methods in practice to adjust the Normal Cost rate for this type of plan change. While a detailed analysis of these two variations is beyond the scope of this discussion, our summary conclusions are:

         A. The "replacement life" Entry Age method would base the Normal Cost on the new benefit structure as though it had always been in place, thereby producing a consistent Normal Cost rate for all members in the tier. This has the advantages of a change in Normal Cost (both individual and total) more consistent with what would be expected for a change in future benefit accruals, a stable future Normal Cost rate for the tier and a relatively smaller (compared to the alternative) change in Actuarial Accrued Liability. Its disadvantages are that it may be more complicated to explain and to implement.

         B. The "averaged" Entry Age method would base each member's Normal Cost on the new projected benefit for that member, thereby producing a different Normal Cost rate for different members in the tier, based generally on their service at the time of the change in benefit structure. The advantages and disadvantages are essentially the reverse of those for the replacement life version of Entry Age. The change in Normal Cost is less than what would be expected for a change in future benefit accruals, the future Normal Cost rate for the tier will be unstable (as it eventually reaches the same rate as under the replacement life variation) and there is a relatively larger (compared to the alternative) change in Actuarial Accrued Liability. Its advantages are that it may be less complicated to explain and to implement (where the latter may depend on the valuation software used).

3. While not recommended for funding, the Normal Cost under the Ultimate Entry Age method discussed above may nonetheless be useful when a new open tier is adopted for future hires. The combined normal cost rate for the open and closed tiers (as determined under the LCAM Entry Age method) will change over time as members of the closed tier are replaced by members in the new tier. This will result in an increasing or decreasing

3 Note that, as of this writing, for public sector pension plans this is relatively uncommon because of legal protections that are understood to apply both to accrued benefits and to future benefit accruals for current members.

combined normal cost rate (depending on whether the new tier has higher or lower benefits), consistent with the transition of the workforce over time to the new benefit level. However, the Ultimate Entry Age method Normal Cost for the combined tiers will reflect the expected long term Normal Cost for the entire workforce (unlike the LCAM Normal Cost which reflects only the recent hires in the new tier). For that reason, Normal Cost under Ultimate Entry Age may be useful for projecting longer-term costs or for evaluating a fixed contribution rate.

Practices

Based on the above discussion, and consistent with the policy objectives, actuarial cost methods and parameters are categorized as follows:

LCAM Model Practices

- Entry Age cost method with level percentage of pay Normal Cost.
  - Normal Costs are level even if benefit accrual or eligibility changes with age or service.
  - All types and incidences of benefits are funded over a single measure of expected future service[4].
  - The Normal Cost for a tier of benefits is the sum of the individually determined Normal Costs for all members in that tier.
  - Exception: for plans with benefits unrelated to compensation the Entry Age method with level dollar Normal Cost may be more appropriate.
- For multiple tiers:
  - Normal Cost is based on each member's benefit.
- For benefit formula or structure changes within a tier (generally after a fixed date):
  - Normal Cost is based on current benefit structure (replacement life Entry Age[5]).

Acceptable Practices

- Aggregate cost method: Plans using the Aggregate method should disclose costs and liabilities determined under the Entry Age method.
  - Calculate Normal Cost and UAAL under Entry Age method.
  - Determine single amortization period for the Entry Age UAAL that, combined with the Entry Age Normal Cost, is equivalent to Aggregate method Normal Cost.
- Frozen Initial Liability cost method: This method should disclose costs and liabilities under the Entry Age method.
  - Calculate Normal Cost and UAAL under Entry Age method.
  - Deduct the FIL amortization bases from the Entry Age UAAL.
  - Determine single amortization period for the remaining Entry Age UAAL that, combined with the Entry Age Normal Cost, is equivalent to FIL method Normal Cost.
- Funding to Decrement Entry Age method, where each type and incidence of benefit is funded to each age at decrement.
  - This method may be appropriate for some plan designs or for plans closed to new entrants[6].
- For benefit formula or structure changes within a tier (generally after a fixed date):

4 Under the LCAM model practice, Normal Cost is allocated over service that continues until the member is no longer working. For active members in or expected to enter a DROP (Deferred Retirement Option Program) this includes service through the expected end of the DROP period. This is not the method adopted by GASB in Statements 67 and 68, where service cost is allocated only through the beginning of the DROP period. The GASB method for DROPs is categorized as an Acceptable Practice for funding.

5 Note that this is not the method used in GASB's Statements 67 and 68. The GASB method is categorized as an Acceptable Practice.

6 For example, a Plan that provides very valuable early career-benefits (such as heavily subsidized early retirement or disability benefits) may prefer to have the higher early-career Normal Costs associated with the Funding to Decrement Entry Age method.

- Normal Cost is based on each member's composite projected benefit (averaged Entry Age[7]).

Acceptable Practices, with Conditions

- Projected Unit Credit cost method.
- Entry Age method variation ("Aggregated" Entry Age method) where the Normal Cost for a tier of benefits is determined as the Normal Cost rate for the tier applied to the compensation for the tier, and where the Normal Cost rate for the tier of benefits is determined as the present value of future Normal Costs for all active members in the tier, divided by the present value of compensation for all members in the tier.
- Aggregate or Frozen Initial Liability methods without the disclosures of costs and liabilities determined under the Entry Age method discussed above.

Non-recommended Practices

- Normal Cost based on open tier of benefits even for members not in that open tier (Ultimate Entry Age).
  - Ultimate Entry Age Normal Cost may be useful to illustrate the longer-term Normal Cost for combined tiers or to evaluate fixed contribution rates.

Unacceptable Practices

- Traditional (non-Projected) Unit Credit cost method for plans with pay-related benefits as the primary benefit.
- Note that while this white paper does not address policy issues related to pay-as-you-go funding or terminal funding, such practices would be unacceptable if the policy intent is to fund the members' benefits during the members' working careers.

Transition Policies

- There are no transition policies that apply to funding methods. For substantial method changes (e.g., changing from Projected Unit Credit to Entry Age) special amortization periods could apply. These are discussed in the section on Amortization Policy.

7 Note that this is the version of the Entry Age method required for financial reporting under GASB Statements 67 and 68 for plans with benefit formula or structure changes within a tier.

Asset Smoothing Methods

An asset smoothing method reduces the effect of short term market volatility while still tracking the overall movement of the market value of plan assets.

Specific policy objectives and considerations

1. The funding policy should specify all components of asset smoothing method:
    a. Amount of return subject to deferred recognition (smoothing).
    b. The smoothing period or periods.
    c. The range constraints on smoothed value (market value corridor), if any.
    d. The method of recognizing deferred amounts: fixed or rolling smoothing periods.
2. The asset smoothing method should be unbiased relative to market.
    a. The same smoothing period should be used for gains and for losses.
    b. Any market value corridor should be symmetrical around market value.
3. The asset smoothing method should not be selectively reset at market value only when market value is greater than actuarial value.
    a. Bases may be combined but solely to reduce future, non-level recognition of relatively small net unrecognized past gains and losses (i.e., when the smoothed and market values are already relatively close together).
4. The asset smoothing method should be unbiased relative to realized vs unrealized gain loss.
    a. Base deferrals on total return gain/loss relative to assumed earnings rate.
5. The asset smoothing method should incorporate the ASOP 44 concepts of:
    a. Likely to return to market in a reasonable period and likely to stay within a reasonable range of market, or
    b. Sufficiently short period to return to market or sufficiently narrow range around market.
6. The policy parameters should reflect empirical experience from historical market volatility.
7. The asset smoothing method should support the policy goal of

demographic matching (the intergenerational aspect of interperiod equity) described in general policy objective 2. This leads to a preference for smoothing methods that provide for full recognition of deferred gains and losses in the UAAL by some date certain.

a. Note that this objective is also consistent with the accountability and transparency goals described in general policy objective 4.

Discussion

1. Longer smoothing periods generally reduce contribution volatility. A discussion of smoothing periods could include the following considerations:
   a. To the extent that smoothing periods are considered as being tied to economic or market cycles, those cycles may be believed to be longer or shorter than in past years.
   b. If markets are more volatile, then longer smoothing would be needed even if only to maintain former levels of contribution stability.
   c. Better funded plans, more mature plans and higher benefit plans (i.e., plans with a higher "volatility index") have inherently more volatile contribution rates, so may justify longer smoothing.
   d. Sponsors may be more sensitive to contribution volatility.
2. However, ASOP 44 implies that longer smoothing periods call for narrower market value corridors.
   a. In effect, the corridor imposes a demographic matching style constraint on the use of longer smoothing periods which otherwise would obtain greater volatility management.
3. The model interpretation is that five year smoothing is "sufficiently short" under ASOP 44.
   a. This reflects long and consistent industry practice, as well as GASB Statement 68.
   b. This implies that five year smoothing with no market value corridor is ASOP compliant.
   c. It still may be useful to have a market value corridor as part of the asset smoothing policy.
      i. This avoids having to introduce the corridor structure in reaction to some future discussion of longer smoothing periods.
4. Consider the extensive data available on the impact of smoothing periods and market value corridors after large market downturn (such as occurred in 2008).
   a. The smoothing method manages the transition from periods of lower cost to periods of higher cost.
      i. The level of those higher costs is determined primarily by size of the market loss and UAAL amortization period, not the asset smoothing policy.
   b. The smoothing period determines length of the transition period.
   c. The market value corridor determines cost pattern during the transition.
      i. A wide corridor or no corridor produces a straight line transition.
      ii. "Hitting the corridor" accelerates the cost increases or decreases in early years of transition.
         A. In effect the corridor inhibits the smoothing method after years of large losses (or gains).
      iii. There are various possible policy justifications for such an accelerated transition.
         A. Market timing: get more contributions in while the market is down.
         B. Cash flow management: low market values may impair plan liquidity.
         C. Employer solvency: if the employer eventually is going to default on making contributions, then get as much contribution income as possible before that happens.
         D. Employer preference: employers may prefer to have the higher costs in their rates as soon as possible.

iv. Following the 2008 market decline, these justifications were generally not found to be compelling.

A. The normal lag in implementing new contributions rates defeats iii. A and B.

B. Employers are presumed solvent and if not, accelerating contributions would make things worse.

C. Many employers clearly preferred more time to absorb the contribution increases.

v. Absent these considerations, 2008 experience argues for permitting a wide corridor with a five year smoothing period, based on the fact that five year smoothing produced actuarial value to market value ratios that exceeded 140%.

A. Projections in early 2009 actually showed these ratios could have been as high as 150% if markets had not recovered some before the June 30, 2009 valuations.

5. Other industry indicators for market corridor selection with long smoothing periods

a. CalPERS 2005 policy: 15 year rolling smoothing with 20% corridor.

6. Structural issue: Fixed, separate smoothing periods vs. a single, rolling smoothing period

a. Fixed, separate smoothing periods for each year of market gain or loss insure that all deferred gains and losses are included in the UAAL (and so in the contribution rates) by a known date. This is consistent with accountability and with demographic matching.

b. A single rolling smoothing period avoids "tail volatility" where contributions are volatile not only when gains and losses first occur but also when (under a layered approach) each year's gain or loss is fully recognized.

i. Rolling smoothing is consistent with volatility management but substantially extends the recognition period for deferred investment gains and losses.

A. This will extend the time when the actuarial value of assets is consistently above or below the market value of assets.

B. That argues for narrower corridors than are appropriate for fixed (layered) smoothing periods.

ii. In effect, rolling smoothing recognized a fixed percentage of deferred investment gains and losses each year.

A. For example, 5 year rolling amortization recognizes 20% of the deferred amount.

B. Base corridors on this deferral recognition percentage.

c. With fixed, separate smoothing periods, tail volatility due to alternating periods of market gains and losses can be controlled by limited active management of the separate deferral amounts.

i. One such adjustment involves combining the separate deferral amounts when the net deferral amount is relatively small (i.e., the smoothed and market values are very close together) but the recognition pattern of that net deferral is markedly non-level.

A. The net deferral amount is unchanged as of the date of the adjustment.

B. The period over which the net deferral amount is fully recognized is unchanged as of the date of the adjustment.

ii. Other uses of active management of the deferral amounts may add complexity to the application of the policy and may reduce transparency.

iii. Restarts of fixed, separate smoothing periods should not be used:

A. Too frequently, as this would produce a de facto rolling smoothing period, or

B. To selectively restart smoothing at market value only when market value is greater than smoothed value. This would violate General Policy Objective 5, since it would selectively change the policy only when the effect is to reduce contributions.

Practices

Based on the above discussion, and consistent with the policy objectives, asset smoothing methods and parameters are categorized as follows:

LCAM Model Practices

- Deferrals based on total return gain/loss relative to assumed earnings rate.
- Deferrals recognized in smoothed value over fixed smoothing periods not less than 3 years.
- Maximum market value corridors for various smoothing periods:
  - 5 or fewer years, 50%/150% corridor.
  - 7 years, 60%/140% corridor.
  - 10 years, 70%/130% corridor.
- Five year (or shorter) smoothing with no corridor (including use of market value of assets without smoothing).
- Rolling smoothing periods with the following maximum market value corridors for various smoothing periods:
  - Express rolling smoothing period as a percentage recognition of deferred amount and set corridor at that same percentage. For example:
    - 3 year rolling smoothing means 33% recognition, with a 33% corridor.
    - 4 year rolling smoothing means 25% recognition, with a 25% corridor.
    - 5 year rolling smoothing means 20% recognition, with a 20% corridor.
    - 10 year rolling smoothing means 10% recognition, with a 10% corridor.
  - Perform additional analysis including projections of when the actuarial value is expected to return to within some narrow range of market value.
- Combine smoothing periods or restart smoothing only to manage tail volatility.
  - Appropriate when the net deferral amount is relatively small (i.e., the actuarial and market values are very close together).
    - The net deferral amount is unchanged as of the date of the adjustment.
    - The period over which the net deferral amount is fully recognized is unchanged as of the date of the adjustment.
  - Avoid using frequent restart of smoothing to achieve de facto rolling smoothing.
  - Avoid restarting smoothing only accelerate recognition of deferred gains, i.e., only when market value is greater than actuarial value.
- Additional analysis, such as solvency projections, is likely to be appropriate for closed plans.

Acceptable Practices

- Maximum market value corridors for various smoothing periods:
  - 15 years, 80%/120% corridor.

Acceptable Practices, with Conditions

- Maximum market value corridors for various smoothing periods:
  - 15 years, 80%/120% corridor.

Non-recommended Practices

- Longer than 5 year smoothing with no corridor.
- 15 years or shorter smoothing with corridors wider than shown above.

Unacceptable Practices

- Smoothing periods longer than 15 years

Transition Policies

Generally, transition policies for asset smoothing would allow current layered smoothing to continue subject to the appropriate model corridors (as determined by the future smoothing periods, if changed from the past/current layers). Transition from rolling asset smoothing would fix the rolling layer at its current period.

Amortization Policy

An amortization policy determines the length of time and the structure of the increase or decrease in contributions required to systematically (1) fund any Unfunded Actuarial Accrued Liability or UAAL, or (2) recognize any Surplus, i.e., any assets in excess of the AAL.

Specific policy objectives and considerations

1. Variations in contribution requirements from simply funding the Normal Cost will generally arise from gains or losses, method or assumption changes or benefit changes and will emerge as a UAAL or Surplus. As discussed in the general policy objectives, such variations should be funded over periods consistent with an appropriate balance between the policy objectives of demographic matching and volatility management.
2. As with the Normal Cost, the cost for changes in UAAL should emerge as a level percentage of member compensation[8].
3. The amortization policy should reflect explicit consideration of these different sources of change in UAAL, even if the resulting policy treats different changes in the same way:
    a. Experience gains and losses.
    b. Changes in assumptions and methods.
    c. Benefit or plan changes.
4. The amortization policy should reflect explicit consideration of the level and duration of negative amortization, if any.
    a. This consideration should not necessarily preclude some negative amortization that may occur under an amortization policy that is otherwise consistent with the policy objectives.
    b. Amortization periods developed in consideration of negative amortization (along with other policy goals) may be relevant for level dollar amortization (where negative amortization does not occur).
5. The amortization policy should support the general policy objectives of

8 As with the Normal Cost, this amortization policy objective applies most clearly to benefits (like, for example, most public pension benefits) that are determined and budgeted for as a percentage of individual and aggregate salary, respectively. For benefits that are not pay related, or when costs are budgeted on a basis other than compensation it may be appropriate to modify this objective and the resulting policies accordingly.

accountability and transparency. This leads to a preference for:

a. Amortization policies that reflect a history of the sources and treatment of UAAL.

b. Amortization policies that provide for a full amortization date for UAAL.

   i. Note that this objective is also consistent with the demographic matching aspect of general policy objective 2.

6. The amortization of Surplus requires special consideration, consistent with general policy objective 5 (nature of public plan governance).

   a. Amortization of Surplus should be considered as part of a broader discussion of Surplus management techniques, including:

      i. Excluding some level of Surplus from amortization.

      ii. "Derisking" some portion of plan liabilities by changing asset allocation.

Discussion

1. The policy objectives lead to a general preference for level percentage of pay amortization.

   a. Consistent with policy objectives and with the Normal Cost under the Model Actuarial Cost Method.

   b. This discussion of amortization periods presumes level percentage amortization. Level dollar amortization is discussed separately as an alternative to level percentage amortization.

2. The policy objectives lead to a general preference for multiple, fixed amortization layers.

   a. Fixed period amortization is clearly better for accountability, since UAAL is funded as of a date certain.

   b. Single layer, fixed period amortization is not a stable policy, since period would have to be restarted when remaining period gets too short.

   c. Multiple layer amortization is also more transparent, since it tracks the UAAL by source. However, layered amortization is more complicated and can require additional policy actions to achieve stable contribution rates (including active management of the bases).

   d. Discussion of periods will assume multiple, fixed amortization and then revisit the use of rolling periods to manage volatility.

3. For gains and losses, balancing demographic matching and volatility control leads to an ideal amortization period range of 15 to 20 years.

   a. Lesson learned from the 1990s is that less than 15 years gives too little "volatility control", especially for gains.

      i. Short amortization of gains led to partial contribution holidays (contributions less than Normal Cost) and even full contribution holidays (no contribution required).

      ii. This is inconsistent with general policy objective 5, in that it led to insufficient budgeting for ongoing pension costs and to pressure for benefit increases.

   b. Longer than 20 years becomes difficult to reconcile with demographic matching, the intergenerational aspect of interperiod equity described in general policy objective 2.

      i. 20 years is substantially longer than either average future service for actives or average life expectancy for retirees.

   c. Periods longer than 20 years also entail negative amortization (which starts at around 16 to 18 years for many current combinations of assumptions)[9].

      i. Here negative amortization is an indicator for not enough demographic matching but based on economic rather than demographic assumptions.

9 *Note that for emerging lower investment return and salary increase assumptions even twenty year amortization may entail no negative amortization.*

ii. Consider observed consistency between the period of onset of negative amortization and the periods related to member demographics.

iii. As discussed later in this section, negative amortization is a much greater concern when using open or rolling amortization periods.

d. Two case studies — CalPERS and GASB:

i. CalPERS 2005 analysis focused on volatility management. Resulting funding policy uses exceptionally long periods for gain and loss amortization (as well as for asset smoothing.)

ii. GASB Statements 67 and 68 focus on demographic matching. Resulting expensing policy uses very short recognition periods. (This is cited for comparison only, as the GASB statements govern financial reporting and not funding.)

iii. Our general policy objectives indicate a balance between these two extremes.

4. For assumption changes, while the amortization periods could be the same, a case can be made for longer amortization than for gain/loss, since liabilities are remeasured to anticipate multiple years of future gains or losses.

a. A similar or even stronger case for longer periods could be made for changing cost method (such as from Projected Unit Credit to Entry Age), or for the initial liability for a newly funded plan.

b. However longer than 25 years entails substantial (arguably too much) negative amortization.

5. For plan amendments that increase liabilities, volatility management is not an issue, only demographic matching.

a. Use actual remaining active future service or retiree life expectancy.

b. Could use up to 15 years as an approximation for actives.

i. Any period that would entail negative amortization is inconsistent with general policy goals 2 (demographic matching) and 5 (nature of public plan governance).

c. Could use up to 10 years as an approximation for inactives.

i. Particularly for retiree benefit increases, amortization period should control for negative cash flow where additional amortization payments are less than additional benefit payments.

d. For Early Retirement Incentive Programs use a period corresponding to the period of economic savings to the employer.

i. Shorter than other plan amendments, typically no more than five years[10]

e. For benefit improvements with accelerated payments (e.g. one time "13th check" or other lump sum payments) amortization may not be appropriate as any amortization will result in negative cash flows.

6. Plan amendments that reduce liabilities require separate considerations so as to avoid taking credit for the reduction over periods shorter than the remaining amortization of the original liabilities.

a. Reductions in liability due to such benefit reductions should not be amortized more rapidly than the pre-existing unfunded liabilities, as measured by the average or the longest current amortization period.

b. Benefit "restorations[11]" should similarly be amortized on a basis consistent with the pre-existing unfunded liabilities or with the "credit" amortization base established when the benefits were reduced.

7. For Surplus, similar to short amortization of

---

10 For example, a Government Finance Officers Association (GFOA) 2004 recommended practice states that "the incremental costs of an early retirement incentive program should be amortized over a short-term payback period, such as three to five years. This payback period should match the period in which the savings are realized."

11 A benefit restoration occurs when a previous benefit reduction has been fully or partially restored for a group of members who were subject to the earlier benefit reduction.

gains, the lesson from the 1990s is that short amortization of surplus leads to partial or full contribution holidays (contributions less than Normal Cost, or even zero).

a. This is inconsistent with general policy objective 5, and led to insufficient budgeting for ongoing pension costs and to pressure for benefit increases.

b. General consensus is that this is not good public policy.

   i. See for example Recommendation 7 by California's 2007 Public Employee Post-Employment Benefits Commission, and also CalPERS 2005 funding policy.

c. Because of both the ongoing nature of the Normal Cost and the nature of public plan governance, amortization of UAAL and Surplus should not be symmetrical.

   i. It may be appropriate to amortize surplus over a period longer than would be acceptable for UAAL.

   ii. Such an asymmetric policy would reduce the magnitude and/or likelihood of partial or full contribution holidays.

   iii. One approach would be to disregard the Surplus and always contribute at least the Normal Cost. However if Surplus becomes sufficiently large then some form of Surplus management may be called for.

d. Note that long amortization of Surplus does not preclude other approaches to Surplus management that are beyond the scope of this discussion, including:

   i. Treating some level of Surplus as a non-valuation asset.

   ii. Changing asset allocation to reflect Surplus condition.

8. Separate Surplus related issue: When plan first goes into Surplus, should existing UAAL amortization layers be maintain or eliminated?

   a. Could maintain amortization layers and have minimum contribution of Normal Cost less 30 year amortization of Surplus.

   b. However, maintaining layers can result in net amortization charge even though overall plan is in Surplus.

   c. Alternative is to restart amortization of initial surplus, and any successive Surpluses.

      i. In effect, this is 30 year rolling amortization of current and future Surpluses.

      ii. Restart amortization layers when plan next has a UAAL.

9. Level dollar amortization is fundamentally different from level percent of pay amortization.

   a. No level dollar amortization period is exactly equivalent to a level percent period.

   b. Level dollar is generally faster amortization than level percent of pay, so longer periods may be reasonable.

   c. Plan and/or sponsor circumstances could determine appropriateness of level dollar method.

      i. Level dollar would be appropriate for plans where benefits are not pay related and could be appropriate if the plan is closed to new entrants.

      ii. Level dollar could be appropriate for sponsors and plans that are particularly averse to future cost increases, e.g., utilities setting rates for current rate payers.

      iii. Level dollar could be appropriate for sponsors and plans that want an extra measure of conservatism or protection against low or no future payroll growth.

      iv. Level dollar could be useful as a step in developing amortization payments in proportion to some basis other than payroll.

10. Multiple, fixed period layers vs. single, rolling period layer for gains and losses.

   a. Multiple, fixed amortization periods for each year's gain or loss ensures that all gains and losses are funded by a known date. This is consistent with accountability and with demographic matching.

b. A single rolling smoothing period avoids tail volatility where contributions are volatile not only when gains and losses occur but also when each year's gain or loss is fully amortized. This is consistent with volatility management.

c. With fixed, separate smoothing periods, tail volatility can be controlled by limited active management of the amortization layers, including combining consecutive gain and loss layers as necessary to reduce tail volatility.

   i. As with asset smoothing, active management should be used to manage the pattern of future UAAL funding and not to accomplish a short-term manipulation of contributions.

   ii. In particular the net remaining amortization period should be relatively unaffected by any combination of offsetting UAAL amortization layers.

   iii. The use of active management of the amortization layers may add complexity to the application of the policy and may reduce transparency.

11. Plans with layered amortization of an unfunded liability should consider actions to achieve a minimum net amortization charge that is not less than the payment required under a single 25 year amortization layer. This may be accomplished through active management of the amortization layers or through other means.

12. Rolling amortization periods for a single layer of gains and losses or for the entire UAAL.

    a. Similar to level dollar, acknowledge that rolling amortization is fundamentally different from fixed period amortization.

       i. Rolling amortization will have a substantial unamortized UAAL at the end of the nominal amortization period.

    b. Argument can be made for a single, rolling amortization layer for gains and losses if the actuarial valuation assumptions are expected to be unbiased so that there is an equal likelihood of future gains and losses that will offset each other.

       i. Such rolling amortization also requires that there are no systematic sources of future actuarial losses from plan design features, such as a subsidized service purchase option.

       ii. Extraordinarily large gains or losses that are not reasonably expected to be offset by future losses or gains should be isolated from the single rolling gain/loss amortization layer and amortized over separate, fixed periods.

       iii. Plans with a significant single rolling gain/loss amortization layer should affirmatively show that policy objectives will be achieved, without substantial violation of intergenerational equity.

    c. This argument is substantially weaker for rolling amortization for assumption changes (especially if consistently in a single direction, such as mortality assumption adjustments or recent changes in investment earnings assumptions.)

       i. Inconsistent with policy objective of intergenerational equity, as well as accountability and transparency.

       ii. Similar concerns for rolling amortization of gains and losses in the presence of biased assumptions or other systematic sources of actuarial losses.

    d. It is very difficult to reconcile rolling amortization of plan amendments with intergenerational equity, as well as with accountability and transparency objectives.

    e. Specific exception for rolling, lengthy amortization of Surplus, since as described earlier this helps meet general policy objective 5

13. Rolling amortization and the Aggregate cost method.

    a. The Aggregate cost method produces contribution levels and patterns similar to using the Entry Age method with a single rolling level percent of pay amortization layer for the entire UAAL and a relatively short rolling amortization period.

i. Effective rolling amortization period reflects average future service of active members.

b. However, the Aggregate cost method is fundamentally different from Entry Age (and from Projected Unit Credit) in that Aggregate does not measure an AAL or a UAAL.

i. Aggregate combines a high level of tail volatility management (policy objective #3) with high levels of demographic matching and accountability (policy objectives 2 and 4).

ii. Aggregate also provides no policy flexibility in the selection of an amortization period (since no UAAL is calculated) which provides protection from some agency risk issues, consistent with policy objective #5.

c. Retirement boards desirous of the high level of tail volatility management and computational simplicity associated with rolling amortization of the entire Entry Age UAAL should consider adopting the Aggregate cost method.

i. If a UAAL is measured (as under the Entry Age or Projected Unit Credit cost methods) then, as discussed above, the policy objectives indicate layered amortization with the possible exception of a single rolling amortization layer for gains and losses.

Practices

Based on the above discussion, and consistent with the policy objectives, amortization methods and parameters are categorized as follows:

LCAM Model Practices

- Layered fixed period amortization by source of UAAL
- Level percent of pay amortization
- Amortization periods

Source	Period
Active Plan Amendments[12]	Lesser of active demographics[13], or 15 years
Inactive Plan Amendments	Lesser of inactive demographics[13], or 10 years
Experience Gain/Loss	15 to 20 years
Assumption or Method Changes[14]	15 to 25 years
Early Retirement Incentives	5 years or less

- 30 year amortization of surplus (for plans with ongoing Normal Cost and/or plan expenses)
  - Eliminate all prior UAAL layers upon going into Surplus
- Combine gain/loss (and other) layers or restart amortization only to avoid tail volatility.
  - Combining layers should result in substantially the same current amortization payment.
  - Avoid using restart of amortization to achieve de facto rolling amortization.
  - Restart amortization layers when moving from Surplus to UAAL condition.
- Additional analysis, such as solvency projections, is likely to be appropriate for closed plans.

12 The effect of assumption changes integral to the measurement of the cost of plan amendments (e.g., change in rates of retirement to anticipate the effect of new benefit levels) should be included in the UAAL change associated with the plan amendment.

13 Demographics based periods include remaining active future service or retiree life expectancy. Amortization period should also control for negative cash flow where additional amortization payments are less than additional benefit payments.

14 Method change includes the initial liability for a newly funded plan.

Acceptable Practices

- Up to 15 years for inactive plan amendments.
- Level dollar fixed period layered amortization by source of UAAL, using the same model amortization periods as above.
  - Ideally, some rationale should be given if used with pay related benefits.

Acceptable Practices, with Conditions

- Up to 25 year layered fixed period amortization by source, for all sources of UAAL.
  - Ideally with some rationale given for using periods outside the model ranges.
- Rolling amortization of a single combined gain/loss layer with an amortization period that does not entail any negative amortization.
  - With model periods for other sources of UAAL.
  - Use separate, fixed period layers for extraordinary gain or loss events.
  - Plans with a significant single rolling gain/loss amortization layer should demonstrate that policy objectives will be achieved.
- Up to 30 year fixed amortization of change in funding method (e.g. from PUC to Entry Age) or initial liability for a newly funded plan (i.e. an existing plan previously funded on a pay-as-you-go basis but not a new plan creating new past service benefits.)
  - Ideally some rationale should be given for using periods outside the model ranges.

Non-recommended Practices

- Fixed period amortization of the entire UAAL as a single combined layer, with periodic reamortization over a new (longer) starting amortization period.
- Layered fixed period amortization by source of UAAL over longer than 25 years (i.e., 26 to 30 years).
- Rolling amortization of a single combined gain/loss layer with an amortization period that does entail any negative amortization, but no longer than 25 years.
  - Same three conditions that apply to Acceptable with Conditions rolling gain/loss amortization.
- Rolling/open amortization of entire UAAL as a single combined layer (exclusive of plan amendments but inclusive of gain/loss, assumption and method changes) even where the amortization period does not entail negative amortization.

Unacceptable Practices

- Layered fixed period amortization by source of UAAL over longer than 30 years.
- Rolling/open amortization over longer than 25 years of a single combined gain/loss layer.
- Rolling/open amortization of entire UAAL as a single combined layer (exclusive of plan amendments) where the amortization period entails negative amortization.
- Rolling/open amortization of entire UAAL as a single combined layer (including plan amendments) even where the amortization period does not entail negative amortization.

Transition Policies

Transition policies are particularly applicable to amortization policy. Generally, transition policies for amortization would allow current fixed period amortization layers (with periods not to exceed 30 years) to continue, with new amortization layers subject to these guidelines. Transition from rolling amortization would fix any rolling layer at its current period, with future liability changes amortized in accordance with these guidelines. During the transition (i.e., as long as the remaining period for the formerly rolling base is longer than model or acceptable periods) any new credit layers (e.g., due to actuarial gains or less conservative assumptions) should be amortized over no longer than that same remaining period.

Direct Rate Smoothing

An actuarial funding policy may include some form of direct rate smoothing, where the contribution rates that result from applying the three principal elements of funding policy (including asset smoothing) are then directly modified.

As noted in the Introduction, some practitioners are developing direct contribution rate smoothing techniques as an alternative to asset smoothing. At this time, there are no widely accepted practices established for this type of direct rate smoothing. This discussion does not address the use of direct rate smoothing techniques as an alternative to asset smoothing. The CCA PPC is considering development of a separate white paper on direct rate smoothing as an alternative to asset smoothing.

The balance of this discussion pertains only to direct rate smoothing when used in conjunction with asset smoothing. Two types of such direct rate smoothing policies that are known to be in current practice were evaluated for this development:

1. Phase-in of certain changes in contribution rates, specifically, phasing-in the effect of assumption changes element over short period, consistent with the frequency of experience analyses.
2. Contribution collar where contribution rate changes are limited to a specified amount or percentage from year to year.

Discussion

1. Contribution rate phase-in can be an effective and reasonable way to address the contribution rate impact of assumption changes.
    a. Ideally the phase-in period should be no longer than the time period until the next review of assumptions (experience analysis).
        i. This approach is most appropriate when experience analyses are performed on a regular schedule.
        ii. For systems with no regular schedule for experience analyses, the phase-in period would ideally be chosen so as to avoid overlapping phase-in periods.

a. The plan and its sponsors should be clearly aware of the additional time value of money cost (or savings) of the phase-in, due to the plan receiving less (or more) than the actuarially determined contributions during the phase-in.

b. Any ongoing policy to phase-in the effect of assumption changes should be applied symmetrically to both increases and decreases in contribution rates.

c. Ongoing policy may be to phase-in only significant cost increases or decreases.

d. Note that the phase-in of the contribution rate impact of an assumption change is clearly preferable to phasing in the assumption change itself. While a detailed discussion is outside the scope of this discussion, phasing in an assumption change may be difficult to reconcile with the governing actuarial standards of practice.

2. Contribution collars have the policy drawback that the collar parameters arbitrarily override the contribution results produced by the other funding policy parameters (including asset smoothing), each of which have a well-developed rationale.

   a. If contribution collars are used they should be supported by analysis and projections to show the effect on future funded status and future policy based contribution requirements (prior to the application of the contribution collar).

   b. There may also need to be a mechanism to ensure adequate funding following extraordinary actuarial losses.

3. Using either form of direct rate smoothing for other than assumption changes (i.e., for actuarial experience or plan amendments) appears inconsistent with the development of parameter ranges for the other elements of the funding policy.

Practices

Based on the above discussion, and consistent with the policy objectives, parameters are categorized as follows:

LCAM Model Practices

- None

Acceptable Practices

- For systems that review actuarial assumptions on a regularly scheduled basis, phase-in of the cost impact of assumption changes over a period no longer than the shorter of the time period until the next scheduled review of assumptions (experience analysis) or five years.
  - Phase-in should be accompanied by discussion and illustration of the impact of the phase-in on future contribution rates.
  - Phase-in may be applied only to cost impacts deemed material, but should be applied consistently to both cost increases and decreases.

Acceptable Practices, with Conditions

- For systems that do not review actuarial assumptions on a regularly scheduled basis, phase-in of the cost impact of assumption changes over a period of up to five years.
  - Phase-in of the cost impact of any prior assumption changes must be completed before commencing another phase-in period.
  - Phase-in should be accompanied by discussion and illustration of the impact of the phase-in on future contribution rates.
  - Phase-in may be applied only to cost impacts deemed material, but should be applied consistently to both cost increases and decreases.

Non-recommended Practices

- Phase-in of the cost impact of assumption changes over a period greater than five years.
- Phase-in of the cost impact of actuarial experience, in conjunction with model or acceptable practices for asset smoothing and UAAL amortization.
- Contribution collars in conjunction with model or acceptable practices for asset smoothing and UAAL amortization.
- Phase-in or contribution collars for the cost impact of plan amendments.

Items for Future Discussion

This white paper is intended to address the principal elements of an actuarial funding policy as applicable in most but not all situations. Other issues related to funding policy that may be of varying significance are listed in this section, including some of a more technical nature. These items may be the subjects of future guidance.

Impact of Risk/Employer ability to pay/Level of benefit protection–These are three considerations that could affect the development of an actuarial funding policy. While this white paper notes that these factors should be considered, it does not develop policies or procedures for doing so. This paper also does not address appropriate disclosure items, including disclosures related to risk. These considerations (and interrelationships) are outside of our current scope but are important items for future discussion.

OPEB Plans – As noted earlier, while we believe the general policy objectives developed here apply to OPEB plans as well, application of those policy objectives to OPEB plans may result in different specific funding policies based on plan design, legal status and other features distinctive to OPEB plans. Many of the actuaries who participated in developing this paper work on both pension and OPEB funding. We may address funding policies specific to OPEB plans in a later document. That process would also draw on experts in the design, underwriting and valuation of OPEB plans.

Self Adjusting System–We expect that an increasing number of plans will have self adjusting provisions (in this context we are referring to benefit adjustments). These provisions could impact the selection of funding methods.

Transfers of Service Credit–New entrants (or even current member) are sometimes eligible to transfer service credit for employment prior to plan membership. This generally creates actuarial losses, which is inconsistent with our policy objectives. Later we may discuss whether and how this should be anticipated in the valuation.

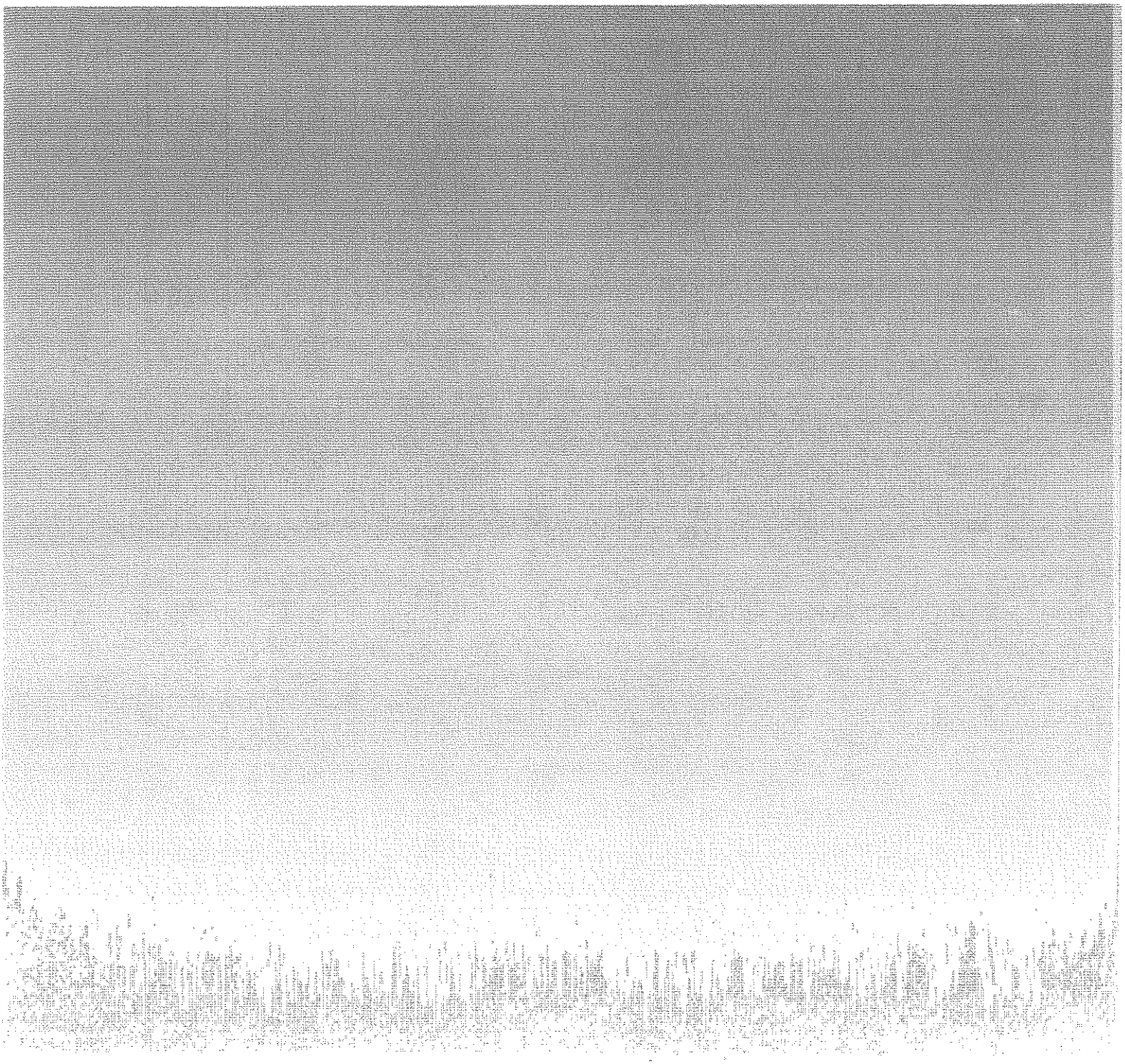
Purchase of Service–This can raise the same type of issues as Transfers of Service Credit since unfunded actuarial liabilities often increase when employees purchase service credit.

Actuarially determined contribution as a dollar amount or percentage of pay–Sometimes the contribution requirement is determined prior to the year it is due and shown as a dollar amount or a percentage of payroll. Either can be

used to determine the contribution amount required.

Role for Open/Stochastic Valuations and risk disclosures–Our guidelines are developed in the context of a closed group, deterministic valuation. This is in part due to the belief that such a valuation best achieves our policy objectives. However, there are also advantages associated with other valuation practices.

Lag time between valuation date and fiscal year – Because of the time needed to produce the valuation and to budget for rate changes, the contribution made for a given fiscal year is often based on an earlier valuation date. This will generate contribution gains or losses when rates decrease or increase, respectively. Some systems adjust for these gains or losses in setting the rates but many do not.



David L. Driscoll
Principal, Consulting Actuary

Buck Consultants, LLC
101 Federal St., Suite 900
Boston, MA 02110

david.driscoll@xerox.com
tel 617.275.8028
fax 201.633.5168

May 9, 2016

Mr. Glen R Grell
Executive Director
Pennsylvania Public School Employees' Retirement System
5 North 5th Street
Harrisburg, PA 17101

Dear Glen:

Re: House Bill No. 727 as amended by A06859 (Printer's No. 1555)

As requested, we have examined the provisions of House Bill No. 727 as amended by A06859, Printer's Number 1555 (hereafter simply referred to as HB-727 as amended), which would create a new Class T-G membership under the Pennsylvania Public School Employees' Retirement System (PSERS) for employees hired after June 30, 2018. In addition, the bill would establish a defined contribution (DC) plan for Class T-G members effective July 1, 2018 and would revise certain PSERS funding provisions effective July 1, 2016. At the direction of PSERS' staff, the effective date of the Class T-G membership for this cost note has been changed from July 1, 2017 to July 1, 2018 to reflect the staff's concern of the administrative difficulties of establishing the new class membership as of July 1, 2017.

PSERS provisions applicable to Class T-G members

- Compensation considered for benefit determination would be limited to the first $50,000 of pay each year. The $50,000 pay limit would be increased/indexed by 1% per year (rounded to the nearest $100). Compensation for both part-time service and partial years of service will be annualized for purposes of application of the limit. The $50,000 pay limit would first be effective July 1, 2018.

- Members would contribute 6% of pay (limited as described above) each year in their first 25 years of service.

- Members would be subject to "shared-risk" contributions if investment returns do not meet certain thresholds. These are similar to the Act 2010-120 "shared-risk" provisions, but the total member contribution rate for Class T-G members would not be less than 6.0% or more than 8.0%. In making the projections shown in the attached Table 1, Class T-G members were assumed to have the same "shared-risk" obligations as Class T-E and T-F members effective for the period beginning 7/1/2020.

- The annual benefit at retirement would be 2% of the highest five-year average pay multiplied by the number of years of service, which would be limited to 25 years.

- Eligibility for unreduced retirement benefits would be reached upon attainment of age 65 with three years of service.

- Members would vest after 10 years of service, but would not be eligible to apply for an early retirement benefit unless they have completed 25 years of service. Benefits of members electing to commence payment prior to age 65 would be reduced based on actuarial equivalence factors.

- Vested members would be ineligible to withdraw their contributions with interest in lieu of receiving a pension.

- Members with five years of service would be eligible for disability benefits.

- Survivors of members with 10 years of service would be eligible to receive death benefits.

- Members would not be eligible to elect an Option 4 lump sum distribution at retirement.

- Members would not be eligible for the Health Care Premium assistance program.

DC Plan provisions

- School employees who begin school service on or after July 1, 2018, would be enrolled in the DC plan.

- DC plan mandatory participant contributions would be:

  - 1.0% of the capped pay used to determine PSERS benefits for the first 25 years of service, plus
  - 7.0% of pay in excess of the capped pay used to determine PSERS benefits and/or for service over 25 years.

  Mandatory participant contributions are intended to be pre-tax "pickup" contributions.

- The DC plan employer contribution would be:

  - 0.5% of the capped pay used to determine PSERS benefits for the first 25 years of service, plus
  - 4.0% of pay in excess of the capped pay used to determine PSERS benefits and/or for service over 25 years.

- Participant contributions to the DC plan would vest immediately. Employer contributions would vest after completion of three years of service.

- Each DC participant will have an individual investment account where all participant and employer contributions are accumulated and investment experience, fees and costs are credited or charged.

The results reported in this cost note are based on the assumption that the DC plan will cover only employees hired on or after July 1, 2018, and do not take into consideration former PSERS members returning to active service and electing Class T-G membership. In addition, the employer contribution under the DC plan does not reflect an offset for forfeitures from participants who terminate prior to completing three years of service.

It should be noted that under HB-727 as amended, the portion of the benefits provided to Class T-G members by the DC plan is subject to investment risk that would be fully borne by participants. Under PSERS, only Class T-E, T-F and now T-G members share responsibility for the fund's investment risk through the Act 2010-120 and HB-727 as amended "shared-risk" additional member contributions (as Class T-C and T-D members are not subject to the "shared-risk" contributions). Additionally, participants would bear the full cost associated with "longevity risk" (i.e., the chance of running out of money in retirement) for benefits provided by the DC plan, while under PSERS, longevity risk is assumed by the System.

PSERS funding provisions

- The accrued liability contribution rate would be computed as a level percentage of total compensation of all active PSERS members and active DC participants using an amortization period of 24 years.

- The experience adjustment factor would be calculated as a level percentage of the total compensation of all active PSERS members and active DC participants using a 24-year amortization period.

- Changes in the accrued liability of PSERS resulting from legislation are to be funded as a level percentage of the total compensation of all active PSERS members and active DC participants using a 10-year amortization period.

- DC participant employers would be surcharged the PSERS accrued liability contribution rate in addition to the employer defined-contribution payments made to the DC plan.

- The normal contribution rate would be determined as a level percentage of total compensation of active PSERS members other than Class T-G members and for Class T-G members' compensation limited by the defined benefit compensation limit and compensation for Class T-G members with less than 25 years of service.

- The results of the 10-year asset-averaging method would be constrained to remain within 30% of the market value of assets.

Estimates of the potential financial impact of HB-727 as amended are presented in the attached tables. These results may be used as estimates of the likely pattern of emerging costs and liabilities resulting from the proposed changes but should not be viewed as a guarantee of actual costs. Actual future funding obligations will be determined by actuarial valuations made on future valuation dates and will likely differ from the estimates provided in these analyses.

Where presented, references to "funded ratio" and "unfunded accrued liability" are measured on an actuarial value of assets basis. It should be noted that the same measurements using market value of assets would result in different funded ratios and unfunded accrued liabilities. Moreover, the funded ratio presented is appropriate for evaluating the need and level of future contributions but makes no assessment regarding the funded status of the plan if the plan were to settle (i.e. purchase annuities) for a portion or all of its liabilities.

The attached Table 1 illustrates the potential expected savings through the 2049 fiscal year. Table 1 compares projected employer contribution obligations under the current benefit and funding provisions of PSERS with those projected to arise under the provisions of HB-727 as amended. We note that the PSERS normal contribution rate under HB-727 as amended is to be determined as a level percentage of compensation of active PSERS members. However, to provide consistency in the comparison made, the results are shown as a percentage of total compensation of all active PSERS members and active DC participants.

We note that Table 1 shows a decreasing projected cost savings towards the end of the examination period:

a. As more employees receive compensation exceeding the indexed $50,000 cap, more employer contributions are made to the DC plan at the 4% rate.

b. The 4% DC plan employer rate is greater than the Class T-E or T-F current System normal cost rate.

Consequently, the trend of decreasing cost savings would be expected to continue beyond 2049.

Table 2 allocates the total projected cost/(savings) between pension and health care premium assistance. In addition, Table 2 provides the estimated effect of risk sharing on the plan under a 6.5% annual investment return scenario for all years of the projection.

Table 3 presents comparisons of the estimated current benefits provided under PSERS for Class T-E members to those that would be provided under HB-727 as amended for the following seven cases: three hypothetical Class T-G members based on retirement at age 65 with 20 years of service, three hypothetical Class T-G members based on retirement at age 65 with 35 years of service and one hypothetical Class T-G member

based on an early retirement at age 60 with 30 years of service. In six of the seven comparisons presented, benefits under HB-727 as amended are projected to be lower than those provided by current law.

Also included are Exhibits which contain four graphs comparing projected contribution amounts, contribution rates, unfunded accrued liabilities and funded percentages under the current plan provisions to those projected under HB-727 as amended.

Proposed Class T-G members, along with members of Classes T-E and T-F, would share responsibility for the fund's investment risk through the Act 2010-120 and HB-727 as amended "shared-risk" additional member contributions. The purpose of the shared-risk provision is to offset employer contribution requirements during extended periods of unfavorable investment experience, in effect requiring PSERS members to "share the risk" of investment experience with the employer. Table 2 and Exhibit V show the projected impact of the shared-risk provision if annual investment returns on the System's assets throughout the projection period were 6.5%, which is 1% less than the System's current 7.5% return assumption.

Exhibit V shows a comparison of projected employer costs and member shared-risk contributions under the current PSERS system and those arising from HB-727 as amended under the assumption that the return on assets is 6.50% for all years of the projection. As outlined in the note at the bottom of Exhibit V and on Table 2, there is a slight decrease in total employer contributions due to the Class T-G members' DB/DC plan design under HB-727 as amended assuming an annual return on assets of 6.50% when compared to current law. The decrease in employer contributions reflects the reduction in expected Class T-G risk share contributions due to the proposed $50,000 (indexed) cap on pay. The other assumptions used in these projections are those upon which the June 30, 2015, actuarial valuation of the System was based. The rate-of-return scenarios upon which these projections are based are not ones that are likely to develop over the projection period, and accordingly these projections must be viewed as an indication of the range of possible outcomes rather than as predictions that are likely to be fulfilled.

The calculations presented here are based on the data, methods and assumptions used in the June 30, 2015 actuarial valuation of PSERS as well as the following assumptions for the projected actuarial valuations:

- The workforce size is assumed to remain constant over the projection period; and

- Future new employees are assumed to have similar demographic characteristics (age/gender/salary) to those of new members who entered PSERS for in the period July 1, 2012 through June 30, 2015.

It should be noted that one difficulty in the estimation of liabilities arising under HB-727 as amended is that we would expect a change in retirement patterns to result if benefit

entitlements are reduced. In general, decreasing benefits may lead to postponed retirements among affected members, who may need to remain in service longer than would have previously been necessary to earn sufficient benefits to meet their financial needs in retirement. However, the nature and extent of such postponements will not be identified until affected members retire under the new benefit design and a formal experience study is prepared. Therefore, in our cost estimates, we have assumed that there would be no immediate changes in members' retirement patterns.

There are some additional funding concerns that would have to be addressed if HB-727 as amended were to move forward:

1. This analysis is based on an assumed 7.50% annual discount rate. However, under HB-727 as amended, it is possible that liquidity issues may arise due to the shift in liability towards retirees and that the PSERS Board may change the asset allocation to reduce the risk of the portfolio and reflect the need to hold a growing proportion of its assets in more liquid, less volatile asset classes. In general, lowering the risk of the portfolio lowers the discount rate used in the System's valuation. This increases the accrued liabilities and contribution requirements of the System. The cost impact of HB-727 as amended could thus change, potentially significantly, if there is a change in the asset allocation and expected asset return. We recommend that an analysis be performed by PSERS' investment consultant using projected cash flows of the System based on the provisions of HB-727 as amended to determine whether such a reduction in the future assumed long-term rate of return on assets may be warranted. If so, the projections shown on the attachments should be recalculated accordingly.

2. The projected contributions for future fiscal years may differ from those to be determined in actual future actuarial valuations due to demographic and financial experience different from those assumed. This will certainly be the case if the workforce and/or payroll continue to decrease over the next few years. In addition, it is outside the scope of this assignment to determine if the assumptions used in the June 30, 2015, actuarial valuation will remain reasonable for use in future valuations. Accordingly, these results should not be used for any purpose other than providing an estimate of future employer pension cost obligations under HB-727 as amended.

This analysis only provides information with regard to future funding contributions of the System. It does not provide any information with regard to the impact any changes may have on financial disclosures under applicable GASB standards.

This analysis was prepared under my supervision. I am a Fellow of the Society of Actuaries and a Member of the American Academy of Actuaries. I meet the Academy's qualification Standards to issue this Statement of Actuarial Opinion. This report has been prepared in accordance with all applicable Actuarial Standards of Practice and I am available to answer questions about it.

Finally, care should be exercised in using the projections and communicating any results to third parties to ensure that the above caveats and underlying bases of the projections are clearly communicated to any possible recipients.

Please let me know if you have any questions.

Very truly yours,

David L. Driscoll

David L. Driscoll, FSA, MAAA, EA, FCA
Principal, Consulting Actuary

Enc.
Pc: Brian Carl

R:\TOBIN\2016\May\PSERS05062016EAQ - TobashProposalHB727.docx

TABLE 1
Pennsylvania Public School Employees' Retirement System
Projection of Contribution Rates and Funded Ratios As of June 30, 2015
PSERS (Current) vs. House Bill 727 Printer's Number 1555 as amended by A08858 (HB 727)

Fiscal Year Ending June	Appropriation Payroll (thousands)	Members Enrolled in HB 727 DC Plan (thousands): DB Payroll. Below $50,000 (indexed) & up to 25 Years of Service	Members Enrolled in HB 727 DC Plan (thousands): Excess of $50,000 (indexed) and/or after 25 Years of CS	Fiscal Year Market Rate of Return	Pension Rate Floor: Current	Pension Rate Floor: HB 727 DB	Employee Contribution Rate: Current	Employee Contribution Rate: HB 727 DB	Employer Normal Cost Rate: Current	Employer Normal Cost Rate: HB 727 DB	Employer Normal Cost Rate: HB 727 DC	Employer Unfunded Liability Rate: Current	Employer Unfunded Liability Rate: HB 727 DB	Preliminary Employer Pension Rate: Current	Preliminary Employer Pension Rate: HB 727 DB	Health Care Contribution: Current	Health Care Contribution: HB 727 DB	Total Employer Contribution Rate: Current	Total Employer Contribution Rate: HB 727 DB + DC	Total Employer Contribution (thousands): Current	Total Employer Contribution (thousands): HB 727 DB + DC	Total Employer Contribution (thousands): Cost/(Savings): Cash Flow Basis	Total Employer Contribution (thousands): Cost/(Savings): Present Value as of June 30, 2015	Funded Ratio (Actuarial Value of Assets basis): Current	Funded Ratio (Actuarial Value of Assets basis): HB 727 DB	Unfunded Accrued Liability (Actuarial Value of Assets basis and in millions): Current	Unfunded Accrued Liability (Actuarial Value of Assets basis and in millions): HB 727 DB
2014	$ 13,720,000			14.91 %	4.00 %	4.00 %	7.43 %	7.43 %	8.57 %	8.57 %		15.25 %	15.25 %	23.82 %	23.82 %	0.93 %	0.93 %	18.93 %	18.93 %						62.0 %	62.0 %	$ 35,121.2	$ 35,121.2
2015	13,462,000			3.04	4.00	4.00	7.46	7.46	8.46	8.46		17.51	17.51	25.97	25.97	0.90	0.90	21.40	21.40						60.6	60.6	37,335.8	37,335.8
2016	13,375,000			7.50	4.00	4.00	7.49	7.49	8.38	8.38		18.44	18.44	27.82	27.82	0.84	0.84	25.84	25.84	$ 3,456,100	$ 3,456,100	$ 0	$ 0		59.2	59.2	40,620.5	40,620.5
2017	13,549,000			7.50	8.31	8.31	7.62	7.62	8.31	8.31		20.89	20.89	29.20	28.20	0.83	0.83	30.03	30.03	4,068,765	4,068,765	0	0		56.8	56.8	43,159.8	43,159.8
2018	13,658,010			7.50	8.14	8.14	7.52	7.52	8.14	8.14		23.07	23.07	31.21	31.21	0.83	0.83	32.04	32.04	4,376,026	4,376,026	0	0		56.1	56.1	45,087.7	45,087.7
2019	14,012,675	$ 553,562	$ 0	7.50	7.98	7.98	7.52	7.52	7.98	7.98	0.02 %	24.47	24.47	32.45	32.45	0.82	0.82	33.27	33.28	4,662,017	4,664,785	2,768	2,228		55.6	55.6	43,551.4	43,551.4
2020	14,385,408	1,098,647	0	7.50	7.81	7.81	7.53	7.53	7.81	7.81	0.04	25.59	25.59	33.40	33.40	0.80	0.80	34.20	34.24	4,919,816	4,925,303	5,493	4,113		60.1	60.1	43,104.1	43,104.1
2021	14,775,522	1,653,267	0	7.50	7.68	7.57	7.53	7.47	7.66	7.57	0.06	25.06	25.06	32.72	32.63	0.79	0.79	33.51	33.48	4,951,277	4,946,246	(5,032)	(3,506)		61.2	61.2	43,070.0	43,070.0
2022	15,181,732	2,221,156	0	7.50	7.51	7.33	7.53	7.42	7.51	7.33	0.07	25.23	25.23	32.74	32.56	0.77	0.77	33.51	33.40	5,087,398	5,071,177	(16,221)	(10,511)		62.6	62.6	42,587.3	42,587.3
2023	15,592,952	2,786,442	0	7.50	7.36	7.09	7.53	7.37	7.36	7.09	0.09	25.63	25.63	32.99	32.72	0.76	0.76	33.75	33.57	5,262,621	5,234,453	(28,168)	(16,979)		64.1	64.1	41,693.2	41,693.2
2024	16,008,676	3,349,003	1,536	7.50	7.21	6.85	7.53	7.32	7.21	6.85	0.10	25.89	25.89	33.10	32.74	0.74	0.74	33.84	33.58	5,416,727	5,375,909	(40,818)	(22,887)		65.5	65.5	41,290.2	41,290.2
2025	16,425,303	3,901,364	9,510	7.50	7.06	6.62	7.53	7.27	7.06	6.62	0.12	26.16	26.16	33.22	32.78	0.72	0.72	33.94	33.62	5,574,748	5,522,363	(52,384)	(27,323)		67.3	67.2	40,199.8	40,189.8
2026	16,849,867	4,467,927	31,885	7.50	6.90	6.38	7.53	7.23	6.90	6.38	0.14	26.56	26.56	33.46	32.94	0.72	0.72	34.18	33.80	5,759,285	5,695,278	(64,007)	(31,056)		69.2	69.1	38,808.0	38,808.0
2027	17,269,981	5,036,633	75,061	7.50	6.74	6.14	7.53	7.18	6.74	6.14	0.16	26.87	26.87	33.61	33.01	0.69	0.69	34.30	33.86	5,923,607	5,848,175	(75,432)	(34,046)		71.2	71.1	37,123.3	37,123.3
2028	17,684,009	5,613,341	141,746	7.50	6.56	5.89	7.54	7.13	6.56	5.89	0.19	27.19	27.19	33.75	33.08	0.69	0.69	34.44	33.96	6,090,373	6,005,611	(84,762)	(35,588)		73.4	73.2	35,136.3	35,136.3
2029	18,092,525	6,188,849	238,571	7.50	6.40	5.63	7.54	7.07	6.40	5.63	0.22	27.52	27.52	33.92	33.15	0.69	0.69	34.61	34.06	6,261,823	6,162,892	(98,931)	(38,539)		75.7	75.5	32,832.8	32,832.9
2030	18,496,390	6,766,630	384,517	7.50	6.22	5.36	7.54	7.00	6.22	5.36	0.26	27.88	27.88	34.10	33.26	0.68	0.69	34.79	34.21	6,434,894	6,327,872	(107,022)	(38,982)		78.2	77.9	30,172.9	30,172.9
2031	18,901,232	7,333,978	522,593	7.50	6.04	5.11	7.54	6.93	6.04	5.11	0.30	28.25	28.25	34.29	33.36	0.69	0.69	34.98	34.35	6,611,651	6,493,395	(118,256)	(39,966)		80.8	80.6	27,122.1	27,122.1
2032	19,306,605	7,909,963	714,973	7.50	5.86	4.84	7.54	6.84	5.86	4.84	0.35	28.64	28.64	34.50	33.48	0.69	0.69	35.19	34.52	6,793,994	6,665,153	(128,841)	(40,506)		83.6	83.4	23,647.8	23,647.8
2033	19,711,447	8,450,457	948,036	7.50	5.67	4.55	7.54	6.75	5.67	4.55	0.41	29.04	29.04	34.71	33.59	0.69	0.69	35.40	34.69	6,977,852	6,837,329	(140,523)	(41,097)		86.6	86.4	19,712.1	19,712.1
2034	20,119,213	9,049,773	1,219,904	7.50	5.48	4.27	7.54	6.64	5.48	4.27	0.47	29.46	29.46	34.94	33.73	0.69	0.69	35.63	34.89	7,166,476	7,016,979	(149,496)	(40,670)		89.8	89.6	15,274.8	15,274.8
2035	20,534,466	9,616,884	1,534,268	7.50	5.28	3.98	7.54	6.52	5.28	3.98	0.53	29.86	29.86	35.16	33.86	0.69	0.69	35.85	35.08	7,361,806	7,203,991	(157,814)	(39,887)		93.3	93.1	10,293.6	10,293.6
2036	20,958,917	10,179,048	1,894,980	7.50	5.08	3.69	7.54	6.39	5.08	3.69	0.60	14.66	14.66	19.74	18.35	0.69	0.69	20.43	19.64	4,282,111	4,117,315	(164,796)	(38,796)		94.9	94.7	8,000.0	8,000.0
2037	21,392,675	10,733,256	2,302,982	7.50	4.87	3.38	7.54	6.26	4.87	3.38	0.68	10.91	10.91	15.78	14.29	0.69	0.69	16.47	15.66	3,523,374	3,350,229	(173,144)	(37,917)		96.1	95.9	6,272.1	6,272.1
2038	21,836,126	11,267,933	2,751,691	7.50	4.67	3.08	7.54	6.11	4.67	3.08	0.76	9.28	9.28	13.95	12.36	0.69	0.69	14.64	13.81	3,196,809	3,015,825	(180,984)	(36,856)		97.1	96.9	4,721.2	4,721.2
2039	22,283,310	11,824,540	3,263,501	7.50	4.46	2.78	7.54	5.95	4.46	2.78	0.85	7.41	7.41	11.87	10.19	0.69	0.69	12.56	11.73	2,800,040	2,614,642	(185,397)	(35,133)		97.9	97.8	3,426.8	3,426.8
2040	22,765,838	12,352,540	3,828,290	7.50	4.26	2.48	7.54	5.78	4.26	2.48	0.94	5.95	5.85	10.21	8.43	0.69	0.69	10.90	10.08	2,481,456	2,290,362	(191,092)	(33,685)		98.6	98.5	2,332.7	2,332.7
2041	23,256,592	12,979,821	4,433,587	7.50	4.05	2.18	7.54	5.60	4.05	2.18	1.04	4.65	4.65	8.70	6.83	0.69	0.69	9.39	8.58	2,183,794	1,989,623	(194,171)	(31,840)		99.2	99.1	1,427.6	1,427.6
2042	23,771,462	13,375,667	5,102,003	7.50	3.86	1.88	7.54	5.41	3.86	1.88	1.14	2.58	2.58	6.44	4.46	0.69	0.68	7.13	6.28	1,694,905	1,493,875	(201,030)	(30,565)		99.5	99.4	922.8	922.8
2043	24,320,134	13,867,040	5,805,317	7.50	3.67	1.60	7.54	5.22	3.67	1.60	1.24	1.04	1.04	4.71	2.64	0.69	0.68	5.40	4.56	1,313,287	1,109,476	(203,811)	(28,920)		99.6	99.5	740.0	740.0
2044	24,918,450	14,322,237	6,575,700	7.50	3.50	1.33	7.54	5.03	3.50	1.33	1.34	(0.16)	(0.16)	3.34	1.17	0.69	0.68	4.19	3.35	1,044,083	835,348	(208,735)	(27,552)		99.6	99.5	795.6	795.6
2045	25,575,166	14,765,648	7,368,948	7.50	3.34	1.09	7.54	4.84	3.34	1.09	1.44	0.79	0.79	4.13	1.88	0.69	0.68	4.82	4.00	1,232,725	1,023,249	(209,476)	(25,721)		99.6	99.6	653.2	653.2
2046	26,301,180	15,181,726	8,263,052	7.50	3.22	0.88	7.53	4.65	3.22	0.88	1.55	0.81	0.81	4.03	1.69	0.69	0.67	4.72	3.91	1,241,416	1,026,045	(213,371)	(24,371)		99.7	99.7	490.4	490.4
2047	27,097,844	15,576,054	9,210,756	7.50	3.11	0.69	7.53	4.47	3.11	0.69	1.65	0.55	0.55	3.66	1.24	0.69	0.67	4.35	3.56	1,178,756	963,635	(215,121)	(22,857)		99.8	99.8	379.5	379.5
2048	27,966,454	15,957,411	10,184,094	7.50	3.02	0.55	7.53	4.28	3.02	0.55	1.74	0.48	0.48	3.50	1.03	0.69	0.68	4.19	3.43	1,171,784	960,292	(211,503)	(20,905)		99.9	99.8	274.2	274.2
2049	28,811,841	16,316,243	11,197,760	7.50	2.97	0.44	7.52	4.09	2.97	0.44	1.83	0.42	0.42	3.39	0.86	0.69	0.65	4.08	3.34	1,179,607	966,302	(213,305)	(18,512)		99.8	99.9	174.0	174.0
																				Total:		$ 141,663,205	$ 137,656,022	$ (4,025,183)	$ (870,041)				

This is an attachment to Buck's May 3, 2016 cost note on HB 727. Please refer to that cost note for more information.

Table 2

Pennsylvania Public School Employees' Retirement System

A. Cost/(Savings) Allocation of Table 1 - Total Potential Projected Cost/(Savings) Due to House Bill 727 Printer's Number 1555 as amended by A06859

	Amounts in millions* Cash Flow Basis	Present Value As of June 30, 2016
Benefit Reforms	$ (3,983)	$ (865)
Health Care premium assistance	(42)	(5)
Total House Bill 727 Cost/(Savings)	$ (4,025)	$ (870)
Cost due to shift from Defined Benefit to Defined Contribution	**	**

* Estimated cost/(savings) are presented on two bases: a cash flow basis and a present value basis. Cost/(savings) shown on a cash flow basis are the sums of the dollar amounts of (reductions)/increases in the projected contributions the employers would have to make in future years if the proposed changes in System provisions are enacted. The calculation of cost/(savings) on this basis makes no distinction between a dollar of projected cost/(savings) in one future year and a dollar of cost/(savings) in some other year in the nearer or more distant future. The calculation of cost/(savings) on a present value basis, on the other hand, involves discounting projected reductions in contributions from the times they are expected to occur to June 30, 2015, at a rate of 7.50% (the assumed interest rate presently used in the annual actuarial valuations of the System) to reflect the time value of money. It is useful to compare cost/(savings) measured on a present value basis with those measured on a cash flow basis because a dollar of cost/(savings) in future years has a lower value in today's dollars than a dollar that must be paid today.

** Please refer to Item 1 on page 6 of the cost note. This cost note does not include an analysis of the potential costs to the System due to the shift of assets and liabilities from the defined benefit plan to a defined contribution plan.

B. Risk-Sharing Analysis assuming a 6.5% annual investment return

	$ Millions
a. Reduction in cumulative Employer contributions due to HB 727 assuming a 6.50% return (see Exhibit V)	$ (4,059)
b. Cumulative Employer cost/(savings) under HB 727 assuming a 7.50% return (see Table 1)	(4,025)
c. Net reduction in cumulative Employer contributions due to Class T-G members' DB/DC plan design = a - b	$ (34)

The effect of a 6.50% return on System assets results in insignificant changes to employer contributions when compared to total employer contributions over the examination period.

The net reduction in cumulative Employer contributions due to Class T-G members' DB/DC plan design reflects the following reduction in expected Class T-G risk share contributions due to the proposed $50,000 (indexed) cap on pay.

Reduction in cumulative member risk-share contributions due to HB 727 assuming a 6.50% return (see Exhibit V)	$ 1,372

This is an attachment to Buck's May 9, 2016 cost note on HB 727 as amended. Please refer to that cost note for more information.

TABLE 3

Pennsylvania Public School Employees' Retirement System

Comparison of Benefits
PSERS Class T-E members vs. T-G Stacked Hybrid Member- $50,000 pay limit Indexed

Employee	A	B	C	D	E	F	G
Age at Hire	30	30	30	45	45	45	30
Age at Termination	65	65	65	65	65	65	60
Retirement Age	65	65	65	65	65	65	60
Salary at Termination	$ 61,967	$ 82,622	$ 103,278	$ 35,753	$ 47,671	$ 59,588	$ 79,679
PSERS Benefit	$ 41,828	$ 55,770	$ 69,713	$ 13,791	$ 18,387	$ 22,984	$ 39,185
Stacked Hybrid Proposal: DB	$ 12,217	$ 12,217	$ 12,217	$ 12,977	$ 13,116	$ 13,116	$ 9,613
Stacked Hybrid Proposal: DC	$ 9,154	$ 14,782	$ 21,084	$ 832	$ 1,795	$ 3,529	$ 8,971
Stacked Hybrid Proposal: Total	$ 21,371	$ 26,999	$ 33,301	$ 13,809	$ 14,911	$ 16,645	$ 18,584
Stacked Hybrid Proposal / PSERS Benefit	51%	48%	48%	100%	81%	72%	47%

Defined Benefit Design

Pay Limit	**$50,000 indexed by 1% in the future**
Credited Service Limit	**25 years**
Benefit Accrual Rate	**2.00%**
Member DB Contribution	**6.0% for pay below limit, 0.0% for pay above limit and for pay after 25 years**
Final Average Salary	**5 years based on limited pay**

Defined Contribution Design

Pay limit	**$50,000 indexed by 1% in the future**
Participant DC Contribution	**1.0% for pay below limit, 7.0% for pay above limit and for pay after 25 years**
Employer DC Contributions	**.5% for pay below limit and 4.0% for pay above limit and for pay after 25 years**
Assumed Rate of Return	**6.00%**
Assumed Conversion Rate	**3.00%**
Mortality Table for Conversion	**RP-2014 White Collar (75% female, 25% male)**

* Hypothetical members A and D receive a $30,000 starting salary, hypothetical members B , E and G receive a starting salary of $40,000 and hypothetical members C and F receive a $50,000 starting salary. The projected salary level at termination as well as the projected benefit amounts have been adjusted to show them on a basis of equivalent "2016 dollars" by adjusting for inflationary increases expected over the participant's working lifetime. Thus, the amounts have been adjusted to reflect the impact associated with the 3% inflation assumption inherent in the current economic assumptions.

This is an attachment to Buck's May 9, 2016 cost note on HB 727 as amended. Please refer to that cost note for more information.

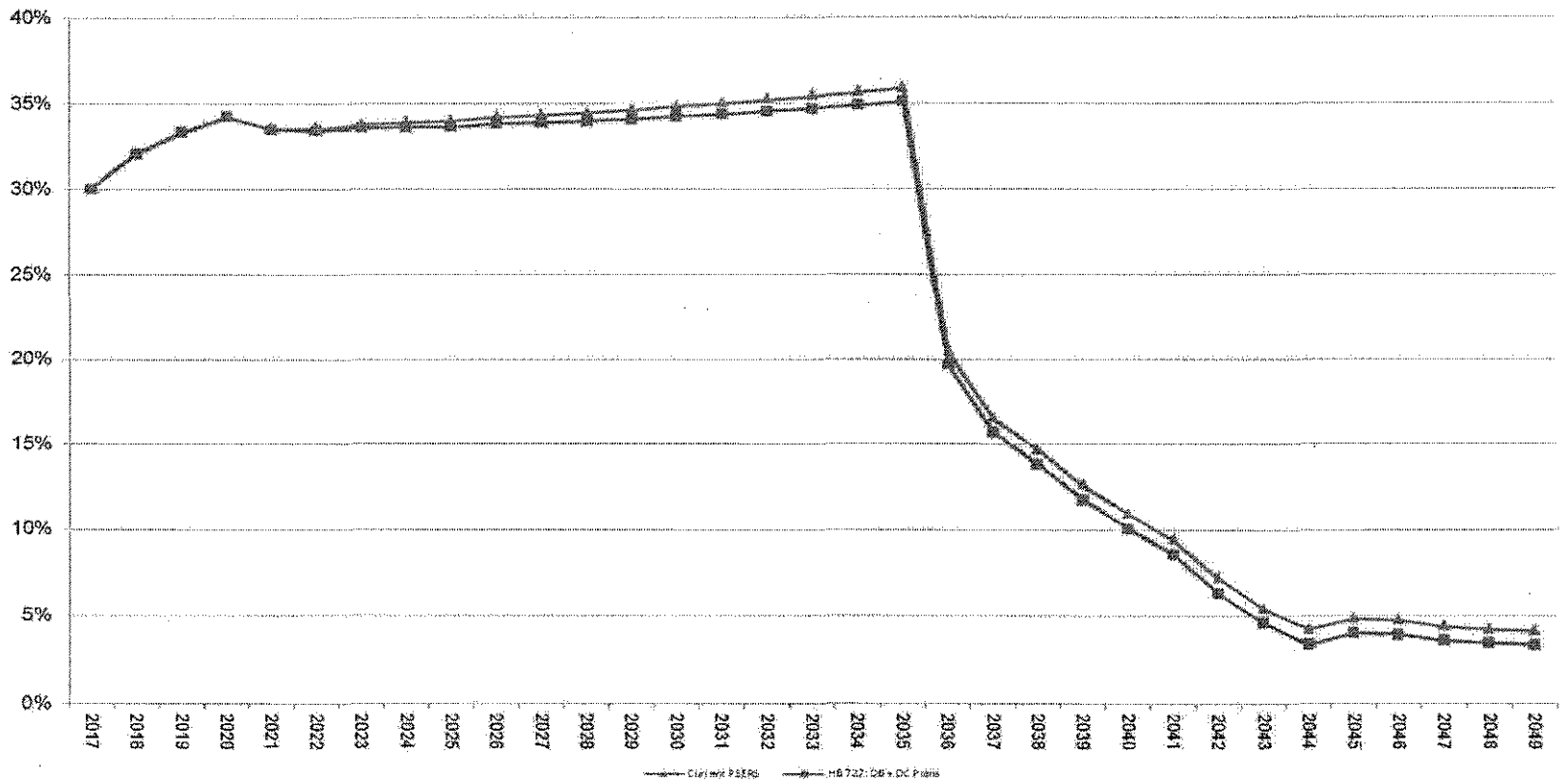
EXHIBIT I
Pennsylvania Public School Employees' Retirement System
PSERS vs. House Bill 727 Printer's Number 1555 as amended by A06859 (HB 727)

Projection of Employer Contribution Dollars (in Millions)

This is an attachment to Buck's May 9, 2016 cost note on HB 727. Please refer to that cost note for more information.

EXHIBIT II
Pennsylvania Public School Employees' Retirement System
PSERS vs. House Bill 727 Printer's Number 1555 as amended by A06859 (HB 727)

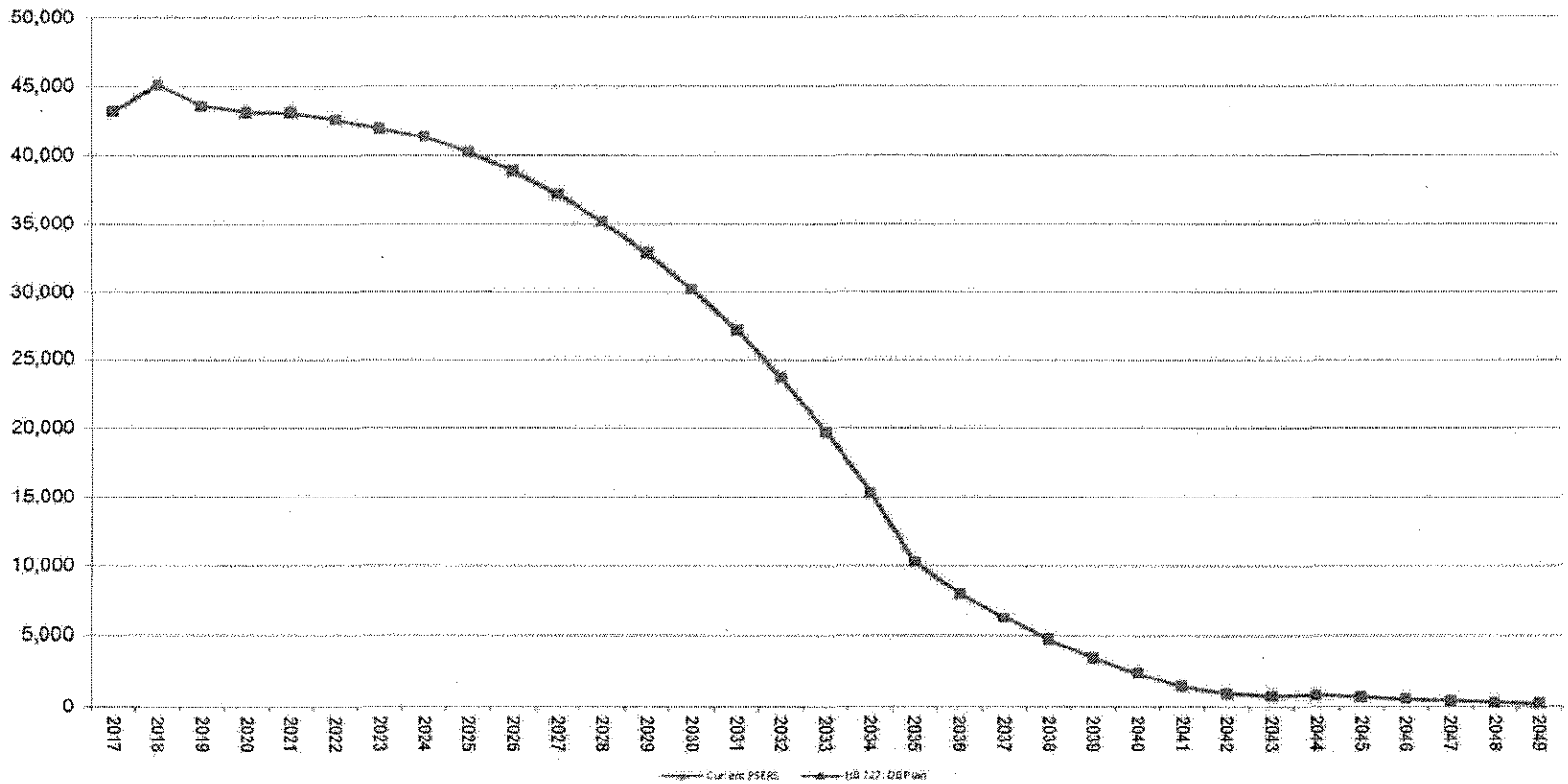
Projection of Total Employer Contribution Rate



This is an attachment to Buck's May 9, 2016 cost note on HB 727. Please refer to that cost note for more information.

EXHIBIT III
Pennsylvania Public School Employees' Retirement System
PSERS vs. House Bill 727 Printer's Number 1555 as amended by A06859 (HB 727)

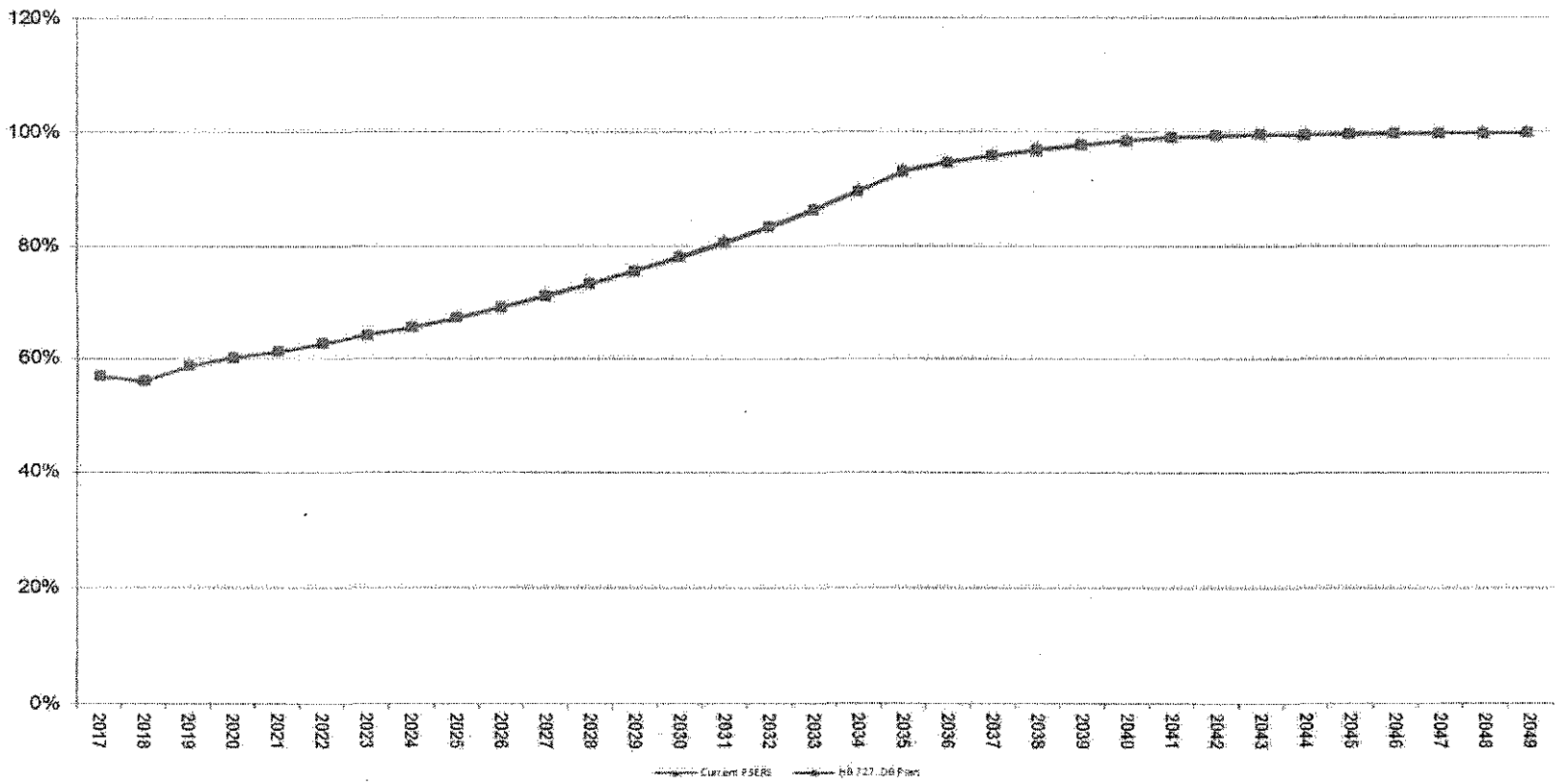
Projection of Unfunded Liability (Actuarial Value of Assets basis and in millions)



This is an attachment to Buck's May 9, 2016 cost note on HB 727. Please refer to that cost note for more information.

EXHIBIT IV
Pennsylvania Public School Employees' Retirement System
PSERS vs. House Bill 727 Printer's Number 1555 as amended by A06859 (HB 727)

Projection of System Funded Ratio (Actuarial Value of Assets basis)



This is an attachment to Buck's May 9, 2016 cost note on HB 727. Please refer to that cost note for more information.

Exhibit V

Public School Employees' Retirement System of Pennsylvania

Additional Member and Employer Contributions Assuming a 6.50% Investment Return (1.00% below the assumed annual discount rate)

Fiscal Year	(x1,000) Current Plan Employer Contributions @ 6.5%	(x1,000) HB 727 Employer Contributions @6.5% return	(x1,000) Total Additional Employer Contributions	(x1,000) Additional T-E/T-F Act 120 Member Risk Share Contributions	(x1,000) Additional T-E/T-F/T-G HB 727 Member Risk Share Contributions	(x1,000) Total Additional Member Contributions
2016	$ 3,456,100	$ 3,456,100	$ -	$ -	$ -	$ -
2017	4,068,765	4,068,765	-	-	-	-
2018	4,380,124	4,380,124	-	-	-	-
2019	4,673,227	4,675,995	2,768	-	-	-
2020	4,944,265	4,949,758	5,493	-	-	-
2021	4,992,649	4,987,617	(5,032)	-	-	-
2022	5,151,162	5,134,940	(16,221)	-	-	-
2023	5,356,179	5,328,010	(28,169)	-	-	-
2024	5,546,383	5,505,564	(40,818)	-	-	-
2025	5,748,856	5,696,472	(52,384)	-	-	-
2026	5,986,758	5,922,751	(64,007)	-	-	-
2027	6,212,016	6,136,584	(75,432)	-	-	-
2028	6,444,053	6,359,291	(84,762)	35,758	35,590	(168)
2029	6,688,806	6,589,876	(98,931)	39,167	38,772	(395)
2030	6,937,996	6,830,974	(107,022)	42,732	41,985	(746)
2031	7,199,479	7,079,334	(120,146)	92,953	90,462	(2,491)
2032	7,469,725	7,340,885	(128,841)	100,811	96,973	(3,838)
2033	7,746,599	7,606,075	(140,523)	109,045	103,543	(5,503)
2034	8,035,614	7,886,117	(149,496)	176,490	165,198	(11,293)
2035	8,336,993	8,177,325	(159,668)	189,966	174,992	(14,974)
2036	5,367,835	5,200,943	(166,892)	203,994	184,726	(19,268)
2037	4,725,642	4,550,358	(175,284)	291,475	259,165	(32,310)
2038	4,524,446	4,339,095	(185,351)	311,716	271,809	(39,907)
2039	4,255,793	4,068,166	(187,627)	332,603	284,104	(48,499)
2040	4,072,773	3,879,404	(193,369)	354,110	296,162	(57,948)
2041	3,921,061	3,724,564	(196,497)	376,191	307,465	(68,727)
2042	3,577,605	3,371,820	(205,785)	398,855	318,235	(80,620)
2043	3,339,154	3,132,911	(206,243)	422,124	328,757	(93,368)
2044	3,169,627	2,958,400	(211,227)	445,872	338,428	(107,444)
2045	3,537,050	3,325,017	(212,033)	469,970	347,715	(122,255)
2046	3,679,535	3,463,534	(216,001)	494,205	355,726	(138,479)
2047	3,742,212	3,527,091	(215,121)	518,319	362,714	(155,605)
2048	3,853,777	3,642,274	(211,503)	542,367	368,354	(174,013)
2048	3,972,501	3,759,196	(213,305)	566,090	372,120	(193,971)
Total	**$ 175,114,758**	**$ 171,055,331**	**$ (4,059,427)**	**$ 6,514,815**	**$ 5,142,996**	**$ (1,371,819)**

Note:

	x $1,000
a. Cumulative Employer contributions under HB 727 assuming a 6.50% return	$ 171,055,331
b. Cumulative Employer contributions under the current PSERS plan assuming a 6.50% return	175,114,758
c. Reduction in cumulative Employer contributions due to HB 727 assuming a 6.50% return = a - b	$ (4,059,427)
d. Cumulative Employer cost/(savings) under HB 727 assuming a 7.50% return = Table 1	(4,025,183)
e. Net reduction in cumulative Employer contributions due to Class T-G members' DB/DC plan design = c - d	$ (34,244)

This is an attachment to Buck's May 9, 2016 cost note on HB 727. Please refer to that cost note for more information.

HayGroup®

Actuarial Cost Note -
Projected Impact of Legislation Related to a
SERS Hybrid Defined Benefit (DB)/Defined Contribution (DC) Plan Design
Proposed by Representative Tobash – HB 727, PN 1555, As Amended by A06859

Hay Group has prepared this cost note in connection with the draft legislative language provided to us that sets forth a hybrid defined benefit (DB)/defined contribution (DC) plan design proposed by Representative Mike Tobash. Under this proposal, most employees who join SERS on or after January 1, 2017 would no longer be covered by SERS' current benefits, but rather would be covered by a hybrid DB/DC plan design including key features as described below. It is SERS' understanding that a corrective amendment is in the process of being introduced that will change the effective date to January 1, 2018 for new SERS members. This corrective amendment will provide the system ample time to implement a new defined contribution component. Please note that the new effective date has been referenced throughout this document, and all cost projections herein reflect an anticipated January 1, 2018 implementation.

Exemption for Pennsylvania State Police

This proposal exempts the Pennsylvania State Police from the proposed new plan design. That is, under this proposal (hereafter, "HB 727, A06859"), the Pennsylvania State Police would continue their SERS benefits as-is, except for several relatively minor changes. References hereafter in this note to "all employees hired or rehired after the hybrid plan start date" being subject to the proposed new DB/DC plan provisions should be understood, if not specifically excepted, to exclude Pennsylvania State Police.

Hay Group has performed cost projections to approximate the impact on future SERS funding if HB 727, A06859 were to become law. In this cost note and the attached schedules, we are presenting a summary of the key provisions of HB 727, A06859 and the results of our cost projections and analyses.

More on HB 727, A06859

HB 727, A06859 would mandate that, with limited exceptions noted herein, all employees hired after the hybrid plan start date of January 1, 2018 would be covered by the proposed new hybrid DB/DC plan. Therefore, they would become participants in a new SERS hybrid DC plan, which would be separate from the SERS DB system. Each hybrid DC participant would have established for him/her an individual investment account within the SERS hybrid DC trust fund, which would be separate from the SERS DB fund.

Certain Educational Employees

We understand that the availability of the option of certain educational employees to elect membership in either SERS, PSERS or an independent retirement program approved by the

employer (such as TIAA-CREF) would continue if HB 727, A06859 were enacted. Absent information that would indicate otherwise, Hay Group has performed our cost analysis of this proposal assuming that future (post-HB 727, A06859) hires will opt to join SERS at approximately the same rate (i.e., with about the same likelihood) as past (pre-HB 727, A06859) hires.

Impact on Current SERS Members

HB 727, A06859 would not change benefit provisions applicable to current SERS members or to members who join SERS prior to the hybrid plan start date, so long as such members remain continuously employed.

Current SERS members would not have an option to leave their existing classes of service and join the hybrid plan.

In general, the "footprint rule" will apply. That is, legacy SERS members who have a break in service and return to employment after the hybrid plan start date would return to their former class of service; however, they would also have a 45-day period after their return within which they could waive their prior class of service and join the hybrid plan prospectively.

New SERS Defined Benefit (DB) Class

HB 727, A06859 would create "Class A-5," a new class of DB membership applicable to all SERS employees who are hired after the hybrid plan start date.

Class A-5 would be a new tier within the existent SERS DB system; the new structure would not be a separate plan and would not have a separate fund. Under this proposal, SERS would not be closed to new members; SERS would remain open to Class A-5 members into the future.

Although most existing SERS funding provisions would continue to apply, HB 727, A06859 would enact legislation-related funding approaches that deviate somewhat from current State Employees' Retirement Code (SERC) rules. These provisions are discussed later in this note.

Proposed Hybrid DB/DC Design

This summarizes our understanding of key features of this proposed hybrid DB/DC design:

1. Formula for Single Life Annuity at Superannuation for Class A-5 members:
   2% X 5-Year Final Average Salary X Total Credited Service, not > 25 years

   No "buy-up" to 2.5% accrual rate would be available, as it has been under Act 120.

employer (such as TIAA-CREF) would continue if HB 727, A06859 were enacted. Absent information that would indicate otherwise, Hay Group has performed our cost analysis of this proposal assuming that future (post-HB 727, A06859) hires will opt to join SERS at approximately the same rate (i.e., with about the same likelihood) as past (pre-HB 727, A06859) hires.

Impact on Current SERS Members

HB 727, A06859 would not change benefit provisions applicable to current SERS members or to members who join SERS prior to the hybrid plan start date, so long as such members remain continuously employed.

Current SERS members would not have an option to leave their existing classes of service and join the hybrid plan.

In general, the "footprint rule" will apply. That is, legacy SERS members who have a break in service and return to employment after the hybrid plan start date would return to their former class of service; however, they would also have a 45-day period after their return within which they could waive their prior class of service and join the hybrid plan prospectively.

New SERS Defined Benefit (DB) Class

HB 727, A06859 would create "Class A-5," a new class of DB membership applicable to all SERS employees who are hired after the hybrid plan start date.

Class A-5 would be a new tier within the existent SERS DB system; the new structure would not be a separate plan and would not have a separate fund. Under this proposal, SERS would not be closed to new members; SERS would remain open to Class A-5 members into the future.

Although most existing SERS funding provisions would continue to apply, HB 727, A06859 would enact legislation-related funding approaches that deviate somewhat from current State Employees' Retirement Code (SERC) rules. These provisions are discussed later in this note.

Proposed Hybrid DB/DC Design

This summarizes our understanding of key features of this proposed hybrid DB/DC design:

1. Formula for Single Life Annuity at Superannuation for Class A-5 members:
   2% X 5-Year Final Average Salary X Total Credited Service, not > 25 years

   No "buy-up" to 2.5% accrual rate would be available, as it has been under Act 120.

The Final Average Salary (FAS) would generally be calculated by averaging the five highest calendar years of compensation, not to exceed the "Class A-5 Annual Compensation Limit" as defined below.

2. Class A-5 Annual Compensation Limit (ACL): All employees who are first hired after the hybrid plan start date would become members of the hybrid DB system and participants of the hybrid DC plan.

   As such, they would be subject to benefit provisions that are, in part, defined by this new term introduced under HB 727, A06859, which plays a significant role in the coordination of the proposed hybrid DB and DC components.

   a. HB 727, A06859 would define ACL in the SERC as follows: "For calendar year 2018, the amount of $50,000. For each subsequent calendar year, the Class A-5 annual compensation limit will be 1% greater than the previous year's amount, rounded to the nearest hundred dollars."

   b. With respect to the hybrid DB component, the ACL:
      i. Limits the amount of compensation each calendar year that would be used to determine a member's five-year FAS, and
      ii. Limits the amount of compensation upon which employee and employer normal contributions would be based for each calendar year during the member's first 25 years of service. (Compensation used for employer UAL amortization contributions is not limited.)

   c. With respect to the hybrid DC component, the ACL would serve as the "breakpoint" for purposes of determining employee/employer contribution rates applicable each calendar year during the participant's first 25 years of service.

3. Class A-5 Service Limit: A second new limit which would play a significant role in coordination of the proposed hybrid DB and DC components is a maximum of 25 years of service credit (or attainment of 25 eligibility points, to use SERC terminology) for purposes of hybrid DB plan participation. That is, when determining participation and annuity benefits payable under the hybrid DB system, credited service for Class A-5 members would be limited to 25 years.

   a. With respect to the hybrid DB component, reaching the 25-year service limit would mark the point at which employee and employer normal contributions to fund the hybrid DB benefit cease. (Employer UAL amortization contributions, however, would continue.)

b. With respect to the hybrid DC component, reaching the 25-year service limit would mark the point at which employee and employer contribution rates relative to salary below the ACL increase.

4. Potential Increase in Hybrid DB Annuity After Reaching Service Limit: A Class A-5 member who reaches the 25-year service limit and continues active employment thereafter could experience an increase in his/her accrued benefit as a result of increases in the five-year FAS which occur after reaching the service limit, as follows:

   a. Annual compensation, subject to the ACL, earned after reaching the 25-year service limit would be included among the calendar years of compensation eligible for inclusion in the FAS determination, and

   b. Annual indexing of 1% per calendar year in the ACL could result in higher salaries being factored into the FAS determination.

5. Contribution Rates under Proposed Hybrid Plan Design: See table that follows.

Proposed Hybrid Defined Benefit (DB)/Defined Contribution (DC) Plan Contribution Rates				
	First 25 Years of Service		After 25 Years of Service	
	Salary Up To Class A-5 ACL	Salary Over Class A-5 ACL	Salary Up To Class A-5 ACL	Salary Over Class A-5 ACL
Defined Benefit (DB)				
Employee, Applicable to All	6%	Not Applicable	Not Applicable	Not Applicable
Employer, Applicable to All	Actuarially Determined	Actuarially Determined	Actuarially Determined	Actuarially Determined
Defined Contribution (DC)				
Employee, Applicable to All	1%	7%	7%	7%
Employer, Applicable to All	0.5%	4%	4%	4%

6. Hybrid DB Superannuation (i.e., Normal Retirement Age): Age 65, with at least three years of credited service. No superannuation for anyone as a result of 35 years of service or Rule of 92.

7. Hybrid DB Early Retirement: If 25 years of service, eligible for early retirement, actuarially reduced from normal retirement age.

8. Hybrid DB Vesting: 10-year cliff. Refund of accumulated deductions (member contributions + 4% statutory interest) payable upon non-vested termination. Upon vested termination before 25 years of service, a deferred annuity commencing at age 65 superannuation is available. In general, members would be guaranteed to receive payments at least equal to their accumulated deductions.

9. Hybrid DB Disability and Death Benefits: Eligibility and benefits would generally be consistent with Act 120, adjusted for Class A-5 limits.

10. Hybrid DB Shared Risk Provision: If DB fund investment returns are low relative to actuarial assumptions, Class A-5 members could be subject to higher employee contribution rates. Projections attached to this note anticipate that the actuarially assumed investment returns are earned in all future years; therefore, for purposes of this cost note, this provision would not impact future SERS costs.

11. Hybrid DC Vesting: Immediate vesting for employee contributions and related earnings/losses; 3-year cliff for employer contributions and related earnings/losses.

12. Hybrid DC Disability and Death Benefits: Vested account balances would generally be available.

Proposed Changes to Current SERS Funding Provisions

As noted previously, under HB 727, A06859, most existing funding provisions would be unaffected, including the Act 2010-120 employer contribution rate collars which would continue, as applicable; however, HB 727, A06859 does include some new legislation-related funding provisions (described in Item 1 below) that deviate from current SERC funding. Also, HB 727, A06859 would fund the unfunded accrued liability (UAL) over total (DB + DC) payroll (as described in Item 2 below).

1. Funding of Liabilities Arising from Legislation: With respect to changes in SERS' UAL that would arise from this legislation:

    a. the change in liability would be funded using a 20-year, level-dollar amortization starting July 1, 2018, and

    b. the cost of such amortization would be included in the SERS employer cost determination prior to, not after, applying the contribution rate collars, if they are still applicable.

2. Funding the Existing UAL and Future Gains/Losses: Current SERS amortization methods would continue to apply; however, the UAL contribution rate would be based upon total payroll, i.e., DB + DC payroll. More specifically, it would be the sum of total DB payroll (existing classes of service + Class A-5) plus the hybrid

DC-only payroll, which includes all active pay under the combined DB system and DC plan.

Hybrid DB Plan – Employer Normal Cost and UAL

Hybrid DB Plan Employer Normal Cost

Based on the employer normal cost calculation mandated by the SERC, Hay Group has determined that the net employer normal cost for the hybrid DB tier expected to join SERS in 2018 (all Class A-5 new entrants) would be approximately 1.14 percent of payroll below the ACL.

This hybrid DB normal cost is significantly lower than the current normal cost of 4.52 percent of payroll primarily due to the following key differences in the proposed hybrid DB design versus the current SERS design:

- The hybrid DB design would limit pensionable compensation to the ACL ($50,000 increasing 1% per year, which is a lower rate of increase than average assumed annual pay increases) and credited service to 25 years (for benefit accrual and member contribution purposes), whereas no such limits currently apply. It should be noted that these limits result in a net decrease in employer costs resulting from lower future benefit accruals, which reduce employer costs and lower future member contributions to the hybrid DB system, which increase employer costs.

- The hybrid DB design would base all Class A-5 benefit accruals on a five-year FAS (a longer, less generous averaging period than currently applicable).

- The hybrid DB design would eliminate superannuation eligibility for both 35 years of credited service and the "Rule of 92."

After the initial employer normal cost rate determination (which we expect would occur as a part of the December 31, 2016 actuarial valuation), the normal cost would be redetermined with each subsequent annual actuarial valuation, and would reflect changes that occur from year to year in (i) the demographic characteristics of each year's new entrant population, (ii) the ACL and (iii) the applicable actuarial assumptions.

It is our expectation that, over time, the rate of increase in the average salary (up to the ACL) for the annual new entrant cohort would be about 3.05 percent per year, consistent with annual salary schedule increases assumed in our valuations. Because the ACL would be scheduled to increase by 1 percent per year, over time, the actuarial present value of future *benefits* for the new entrant cohort would not increase as rapidly as the actuarial present value of future *compensation* for the new entrant cohort. Thus, spreading the normal cost over a relatively larger payroll base would translate into a gradual decline in the hybrid DB total normal cost rate as a percentage of covered payroll.

In order to properly allocate future employer funding of the SERS DB system between the employer normal cost and the UAL, we have projected future normal cost levels to estimate the impact of this gradual change. Based upon our hybrid plan funding projections, the employer normal cost rate (shown in the "Floor Contribution" column of the attached projections) starts at about 1.14 percent of payroll in fiscal 2017/2018 and decreases by about 0.0188 percent of payroll per year to reach a level of about 0.50 percent of payroll in fiscal 2051/2052, the end of our projection period.

Hybrid DB Plan UAL

If HB 727, A06859 would become law, effective in fiscal 2017/2018, the SERS employer normal cost rate would decrease from the current 4.52 percent of payroll based upon Class A-3 new entrants to about 1.14 percent of payroll based on Class A-5 new entrants. At the same time, approximately $2.0 billion in liabilities that were previously scheduled to be funded via future employer normal cost payments would be added to SERS' UAL, thereby increasing the amount of annual funding required to amortize the UAL and causing SERS' funded status to decrease by about 2.4 percent.

Due to expected decreases in the employer normal cost rate (from about 1.14 percent of payroll initially to about 0.50 percent in fiscal 2051/2052, as discussed above), the gradual shifting from future employer normal costs to UAL amortization would continue over the projection period. With each passing year, the amount of liability shifted would be deemed to be a liability loss (and an increment to the projected UAL), which would be funded like other projected actuarial gains and losses, using 30-year, level-dollar amortization. This aspect, though a relatively minor refinement, is included in the hybrid DB plan funding projections attached.

Projection of Future Costs for HB 727, A06859

Based upon census data, asset data and actuarial assumptions underlying the SERS December 31, 2015 actuarial valuation (including an assumed investment return of 7.5 percent per year, compounded annually) and incorporating the proposed new hybrid plan design outlined above and reflecting funding provision changes as described, Hay Group has projected the future employer contributions required under HB 727, A06859.

For purposes of these projections—which include three separate, distinct, and mutually exclusive future payroll streams to which employer funding rates will be applied—we have segmented the aggregate expected future SERS payroll into three projected sub-payrolls:

- Legacy DB Payroll: This is the projected future payroll attributable to current SERS members, members who join SERS prior to the hybrid plan start date and Pennsylvania State Police hired after the hybrid plan start date, because the State Police will retain their current SERS benefit design (with one minor exception, namely, new State Police officers on or after July 1, 2018 will have voluntary overtime pay in excess of 10% of

their base salary excluded from their covered compensation). Future employer cost rates to be spread over (applied to) this future payroll stream would be:

- Hybrid DB employer normal cost, and
- UAL amortization.

- Hybrid DB/DC Payroll: This is the projected future payroll attributable to Class A-5 members, with the ACL and 25-year service limit applied. Future employer cost rates to be spread over (applied to) this future payroll stream would be:

  - Hybrid DB employer normal cost,
  - UAL amortization, and
  - Hybrid DC employer contributions on DB/DC payroll (based on the "below limit" rate of 0.5% of pay).

- Hybrid DC-Only Payroll: This is the projected future payroll attributable to Class A-5 participants recognizing (i) only pay in excess of the ACL during the first 25 years of credited service and (ii) all pay after 25 years of credited service. Future employer cost rates to be spread over (applied to) this future payroll stream would be:

  - UAL amortization, and
  - Hybrid DC employer contributions on DC-only payroll (based on the "above limit" rate of 4% of pay).

Based upon these projected payroll streams and the employer cost rates described above, the hybrid plan schedules attached project the following future employer costs/contributions by fiscal year:

- Expected Fiscal Year DB Contribution =
  [(Hybrid DB Employer Normal Cost Rate) X (Legacy DB Payroll + Hybrid DB/DC Payroll)] + [(UAL Amortization Rate) X (Legacy DB Payroll + Hybrid DB/DC Payroll + Hybrid DC-Only Payroll)]

- Expected Fiscal Year DC Contribution =
  [(Hybrid DC Employer "Below Limit" Contribution Rate) X (Hybrid DB/DC Payroll)] + [(Hybrid DC Employer "Above Limit" Contribution Rate) X (Hybrid DC-Only Payroll)]

Schedules Attached to This Cost Note

We have attached to this note the results of our funding projections, as follows:

- **HB 727, A06859 – Hybrid DB/DC Plan Design**: Hybrid Plan For Post-2017 New Entrants, Other than State Police; Current SERS Benefit Provisions for Pre-2018 Hires; Continuing Current SERS Funding Provisions, Except as Stated in Items 1 and 2 on page 5: This table presents our projection of future SERS funding through fiscal year 2051/2052 and reflects the impact of (i) the proposed change to a hybrid plan design (as outlined in pages 1-4) for new entrants, other than State Police, on or after January 1, 2018 and (ii) revisions, though limited, to current SERS funding provisions (as described in Items 1 and 2 on page 5).

- **Baseline Projection:** This table presents, for purposes of comparison, the results of our December 31, 2015 actuarial valuation and our projection of future funding through fiscal year 2051/2052, assuming no changes to any of the current SERS benefit provisions or funding methodologies.

Results in Brief

As a result of a hybrid DB + DC plan design that provides less favorable overall retirement benefits than provided under current law, if HB 727, A06859 would be enacted it would result in significant cumulative budgetary savings in future SERS funding. Specifically, the projections show estimated cumulative budgetary savings relative to the current SERS baseline through fiscal year 2051/2052 of approximately $7.1 billion.

In addition to the cumulative savings described above, it is important to note the eventual "transfer of risk" that would occur if HB 727, A06859 were to become law. That is, the conversion of SERS from the pure DB system that it is today to a hybrid design with an ever-growing DC component, including participant-directed investments, would result in a gradual transfer of investment risk from SERS' employers to SERS' members (employees). By the end of the projection period (fiscal 2052), this DB/DC design would result in a substantial reduction of investment risk being borne by SERS employers, relative to the level of risk they currently bear.

Important Notes

Please note the following regarding our handling of the attached funding projections:

1. In performing our cost analyses and preparing this cost note and the attachments hereto, Hay Group has applied the proposed changes to current law as presented to us. We have not reviewed or opined on the legality of any aspect of this proposal.

2. Hay Group's past convention of showing results for employer cost projections such as these as percentages of payroll to two decimal places may be somewhat misleading. This level of precision is not really possible for estimates of this nature.

3. All of these projections are based upon the expectation that (i) for all years after 2015, the actual economic and demographic experience of SERS will be consistent with the

underlying actuarial valuation assumptions and (ii) all employer contribution amounts shown in the "Expected FY Contribution" columns will, in fact, be contributed.

4. The attached projection schedules include a particularly important column of information that may warrant further explanation: "Cumulative (Savings) / Cost Relative to Baseline" shows the projected cumulative cost or savings in employer contributions (in millions of dollars) that would result under the HB 727, A06859 hybrid DB/DC plan design versus under the current law (Baseline). In general, projected future savings, if any, are not assumed to be used to accelerate the pay down of subsequent SERS funding costs/liabilities. That is, under Hay Group's cost projection approach, in future years in which we project savings (i.e., we project employer costs to fund the proposal under consideration to be lower than projected Baseline costs), we do not assume that such projected savings will be used to increase the levels of subsequent SERS employer contributions to fund SERS.

5. The cost estimates included herein were based upon our December 31, 2015 actuarial valuation results, including the underlying census data, assets and actuarial assumptions.

Actuarial Certification

To the best of our knowledge, the information we are presenting herein is complete and accurate and all costs and liabilities have been determined in conformance with generally accepted actuarial principles and on the basis of actuarial assumptions and methods which are reasonable (taking into account the past experience of SERS and reasonable expectations) and which represent our best estimate of anticipated experience under the plan.

The actuaries certifying to this valuation are members of the Society of Actuaries or other professional actuarial organizations, and meet the General Qualification Standards of the American Academy of Actuaries for purposes of issuing Statements of Actuarial Opinion.

Respectfully submitted,
Korn Ferry Hay Group, Inc.

By: _____
Brent M. Mowery, F.S.A.
Member American Academy of Actuaries
Enrolled Actuary No. 14-3885

By: _____
Craig R. Graby
Member American Academy of Actuaries
Enrolled Actuary No. 14-7319

May 11, 2016

SERS Projected Employer Contributions
(Based Upon Final December 31, 2015 Valuation)

5/11/2016

HB 727, A06859 - Exempting State Police Employees - Hybrid DB/DC Plan Design

Year	Investment Return	Fiscal Year	Floor Contribution	Projected DB Percent Contribution	Legacy DB Payroll ($ in millions)	Hybrid DB/DC Payroll ($ in millions)	Hybrid DC-Only Payroll ($ in millions)	Total Payroll ($ in millions)	Expected FY DB Contribution ($ in millions)	Expected FY DC Contribution ($ in millions)	Total DB+DC Contribution ($ in millions)	Total DB+DC Contribution as a % of DB+DC Pay	Annual (Savings) / Cost Relative to Baseline	Cumulative (Savings) / Cost Relative to Baseline	Funded Ratio (AV%)	UAL ($ in billions)	Funded Ratio (MV%)
2013	13.60%	2014/2015	5.00%	20.50	5,897.6	-	-	5,897.6	1,209.0	-	1,209.0	20.50	-	-	59.2	17.90	62.4
2014	6.40%	2015/2016	4.95%	25.00	6,021.7	-	-	6,021.7	1,505.4	-	1,505.4	25.00	-	-	59.4	18.17	61.1
2015	0.40%	2016/2017	4.52%	29.50	6,255.2	-	-	6,255.2	1,845.3	-	1,845.3	29.50	-	-	58.0	19.45	56.2
2016	7.50%	2017/2018	1.14%	31.41	6,304.5	128.5	12.9	6,446.0	2,024.6	1.2	2,025.8	31.43	(17.5)	(17.5)	56.3	21.49	54.4
2017	7.50%	2018/2019	1.12%	30.80	6,177.3	420.2	45.1	6,642.6	2,045.7	3.9	2,049.6	30.86	(23.6)	(41.1)	57.2	21.40	55.4
2018	7.50%	2019/2020	1.10%	30.58	6,059.2	701.2	84.8	6,845.2	2,092.6	6.9	2,099.5	30.67	(29.8)	(70.9)	57.5	21.58	56.5
2019	7.50%	2020/2021	1.08%	30.26	5,941.0	978.7	134.2	7,054.0	2,132.9	10.3	2,143.2	30.38	(36.0)	(107.0)	58.0	21.65	57.8
2020	7.50%	2021/2022	1.06%	29.49	5,820.2	1,255.1	193.8	7,269.1	2,141.9	14.0	2,155.9	29.66	(42.4)	(149.3)	59.2	21.31	59.1
2021	7.50%	2022/2023	1.05%	28.74	5,697.7	1,529.1	264.0	7,490.8	2,150.0	18.2	2,168.2	28.94	(48.7)	(198.0)	60.4	20.94	60.3
2022	7.50%	2023/2024	1.03%	27.99	5,566.5	1,806.2	346.5	7,719.3	2,157.0	22.9	2,179.9	28.24	(54.9)	(253.0)	61.7	20.52	61.8
2023	7.50%	2024/2025	1.01%	27.24	5,431.9	2,080.9	441.9	7,954.7	2,162.8	28.1	2,190.9	27.54	(61.1)	(314.1)	63.0	20.04	63.0
2024	7.50%	2025/2026	0.99%	26.51	5,296.5	2,350.2	550.6	8,197.3	2,168.0	33.8	2,201.8	26.86	(67.4)	(381.5)	64.3	19.52	64.3
2025	7.50%	2026/2027	0.97%	25.80	5,158.9	2,615.0	673.4	8,447.3	2,173.1	40.0	2,213.1	26.20	(73.6)	(455.1)	65.7	18.96	65.7
2026	7.50%	2027/2028	0.95%	25.11	5,023.2	2,870.7	811.1	8,705.0	2,178.2	46.8	2,225.0	25.56	(79.7)	(534.8)	67.1	18.34	67.1
2027	7.50%	2028/2029	0.93%	24.44	4,886.9	3,118.6	965.0	8,970.5	2,183.2	54.2	2,237.4	24.94	(85.8)	(620.6)	68.6	17.68	68.6
2028	7.50%	2029/2030	0.91%	23.78	4,743.8	3,364.2	1,136.1	9,244.1	2,188.2	62.3	2,250.5	24.34	(91.8)	(712.4)	70.2	16.96	70.2
2029	7.50%	2030/2031	0.89%	23.15	4,595.5	3,605.7	1,324.8	9,526.0	2,193.3	71.0	2,264.3	23.77	(97.6)	(810.0)	71.8	16.19	71.8
2030	7.50%	2031/2032	0.87%	22.53	4,441.4	3,843.3	1,531.9	9,816.6	2,198.3	80.5	2,278.8	23.21	(103.4)	(913.4)	73.5	15.35	73.5
2031	7.50%	2032/2033	0.86%	21.93	4,282.6	4,075.9	1,757.5	10,116.0	2,203.5	90.7	2,294.2	22.68	(108.9)	(1,022.3)	75.2	14.45	75.2
2032	7.50%	2033/2034	0.84%	21.35	4,116.2	4,306.0	2,000.4	10,424.5	2,208.6	101.5	2,310.1	22.16	(114.5)	(1,136.8)	77.1	13.48	77.1
2033	7.50%	2034/2035	0.82%	20.78	3,959.1	4,526.3	2,257.0	10,742.5	2,213.9	112.9	2,326.8	21.66	(120.1)	(1,256.9)	79.1	12.43	79.1
2034	7.50%	2035/2036	0.80%	20.23	3,804.2	4,738.1	2,527.7	11,070.1	2,219.3	124.8	2,344.1	21.18	(125.7)	(1,382.6)	81.1	11.29	81.1
2035	7.50%	2036/2037	0.78%	19.70	3,653.7	4,941.7	2,812.4	11,407.8	2,224.8	137.2	2,362.0	20.71	(131.5)	(1,514.1)	83.3	10.07	83.3
2036	7.50%	2037/2038	0.76%	17.47	3,503.3	5,140.9	3,111.5	11,755.7	2,029.7	150.2	2,179.9	18.54	(338.0)	(1,852.1)	85.7	8.74	85.7
2037	7.50%	2038/2039	0.74%	17.01	3,355.2	5,334.4	3,424.6	12,114.2	2,035.5	163.7	2,199.2	18.15	(343.8)	(2,196.0)	87.8	7.52	87.8
2038	7.50%	2039/2040	0.72%	16.57	3,210.1	5,522.0	3,751.6	12,483.7	2,041.5	177.7	2,219.2	17.78	(349.8)	(2,545.8)	90.1	6.20	90.1
2039	7.50%	2040/2041	0.70%	12.45	3,067.6	5,704.6	4,092.3	12,864.5	1,573.3	192.2	1,765.5	13.72	(355.9)	(2,901.7)	92.5	4.77	92.5
2040	7.50%	2041/2042	0.68%	9.46	2,927.7	5,871.8	4,457.4	13,256.8	1,224.2	207.7	1,431.9	10.80	(361.8)	(3,263.5)	94.2	3.71	94.2
2041	7.50%	2042/2043	0.67%	6.13	2,790.3	5,987.6	4,883.1	13,661.2	805.5	225.3	1,030.8	7.55	(366.5)	(3,630.0)	95.5	2.92	95.5
2042	7.50%	2043/2044	0.65%	4.06	2,655.8	6,059.5	5,362.5	14,077.8	536.9	244.8	781.7	5.55	(370.2)	(4,000.2)	96.3	2.49	96.3
2043	7.50%	2044/2045	0.63%	3.80	2,525.2	6,133.4	5,848.7	14,507.2	514.1	264.6	778.7	5.37	(374.4)	(4,374.6)	96.6	2.29	96.6
2044	7.50%	2045/2046	0.61%	3.47	2,399.5	6,209.4	6,340.8	14,949.7	479.9	284.7	764.6	5.11	(378.9)	(4,753.6)	97.0	2.11	97.0
2045	7.50%	2046/2047	0.59%	2.59	2,280.7	6,287.1	6,837.9	15,405.7	358.0	304.9	662.9	4.30	(383.9)	(5,137.4)	97.3	1.94	97.3
2046	7.50%	2047/2048	0.57%	2.42	2,168.9	6,367.8	7,338.8	15,875.5	343.0	325.4	668.4	4.21	(387.8)	(5,525.2)	97.4	1.89	97.4
2047	7.50%	2048/2049	0.55%	2.28	2,068.4	6,447.6	7,843.7	16,359.7	330.1	346.0	676.1	4.13	(393.3)	(5,918.5)	97.5	1.85	97.5
2048	7.50%	2049/2050	0.53%	1.99	1,980.3	6,527.2	8,351.3	16,858.7	291.8	366.7	658.5	3.91	(399.3)	(6,317.8)	97.6	1.82	97.6
2049	7.50%	2050/2051	0.51%	1.76	1,904.0	6,607.7	8,861.2	17,372.9	260.3	387.5	647.8	3.73	(406.0)	(6,723.9)	97.7	1.82	97.7
2050	7.50%	2051/2052	0.50%	1.71	1,839.3	6,689.8	9,373.7	17,902.8	260.4	408.4	668.8	3.74	(413.3)	(7,137.2)	97.7	1.87	97.7

SERS Projected Employer Contributions
(Based Upon Final December 31, 2015 Valuation)

5/11/2016

Baseline: December 31, 2015 Data and Assets; Current Entry Age Funding Method; Level Dollar Amortization; 5-Year Smoothing of Assets; 4.50% FY 16 Collar; 4.50% FY 17 Collar; 4.50% FY 18 Collar; 4.50% FY 19 Collar; 4.50% FY 20 Collar; 4.50% FY 21+ Collar; No Asset Fresh Start; Act 120 Benefit Provisions; 7.50% Liability Interest Rate Assumption; No Liability Fresh Start

Year	Investment Return	Fiscal Year	Ceiling Contribution	Floor Contribution	Projected Percent Contribution	Expected FY Payroll ($ in millions)	Expected FY Contribution ($ in millions)	(Savings) / Cost Relative to Current Law Contribution	GASB Compliant (Fiscal Year Contribution)	Funded Ratio (AV%)	UAL ($ in billions)	Funded Ratio (MV%)
2013	13.60%	2014/2015	NA	5.00%	20.50	5,897.6	1,209.0	-	N	59.2	17.90	62.4
2014	6.40%	2015/2016	NA	4.95%	25.00	6,021.7	1,505.4	-	Y	59.4	18.17	61.1
2015	0.40%	2016/2017	NA	4.52%	29.50	6,255.2	1,845.3	-	Y	58.0	19.45	56.2
2016	7.50%	2017/2018	NA	4.52%	31.70	6,446.0	2,043.3	-	Y	58.8	19.46	56.7
2017	7.50%	2018/2019	NA	4.52%	31.21	6,642.6	2,073.2	-	Y	59.6	19.42	57.7
2018	7.50%	2019/2020	NA	4.52%	31.11	6,845.2	2,129.3	-	Y	59.8	19.66	58.8
2019	7.50%	2020/2021	NA	4.52%	30.89	7,054.0	2,179.2	-	Y	60.2	19.79	60.0
2020	7.50%	2021/2022	NA	4.52%	30.24	7,269.1	2,198.3	-	Y	61.4	19.52	61.2
2021	7.50%	2022/2023	NA	4.52%	29.59	7,490.8	2,216.9	-	Y	62.6	19.22	62.5
2022	7.50%	2023/2024	NA	4.52%	28.95	7,719.3	2,234.8	-	Y	63.8	18.87	63.8
2023	7.50%	2024/2025	NA	4.52%	28.31	7,954.7	2,252.0	-	Y	65.1	18.48	65.0
2024	7.50%	2025/2026	NA	4.52%	27.68	8,197.3	2,269.2	-	Y	66.4	18.05	66.4
2025	7.50%	2026/2027	NA	4.52%	27.07	8,447.3	2,286.7	-	Y	67.7	17.58	67.7
2026	7.50%	2027/2028	NA	4.52%	26.48	8,705.0	2,304.7	-	Y	69.1	17.06	69.1
2027	7.50%	2028/2029	NA	4.52%	25.90	8,970.5	2,323.2	-	Y	70.5	16.51	70.5
2028	7.50%	2029/2030	NA	4.52%	25.34	9,244.1	2,342.3	-	Y	72.0	15.91	72.0
2029	7.50%	2030/2031	NA	4.52%	24.79	9,526.0	2,361.9	-	Y	73.5	15.26	73.5
2030	7.50%	2031/2032	NA	4.52%	24.27	9,816.6	2,382.2	-	Y	75.0	14.56	75.0
2031	7.50%	2032/2033	NA	4.52%	23.76	10,116.0	2,403.1	-	Y	76.7	13.80	76.7
2032	7.50%	2033/2034	NA	4.52%	23.26	10,424.5	2,424.6	-	Y	78.4	12.98	78.4
2033	7.50%	2034/2035	NA	4.52%	22.78	10,742.5	2,446.9	-	Y	80.2	12.09	80.2
2034	7.50%	2035/2036	NA	4.52%	22.31	11,070.1	2,469.8	-	Y	82.0	11.13	82.0
2035	7.50%	2036/2037	NA	4.52%	21.86	11,407.8	2,493.5	-	Y	84.0	10.09	84.0
2036	7.50%	2037/2038	NA	4.52%	21.42	11,755.7	2,517.9	-	Y	86.0	8.97	86.0
2037	7.50%	2038/2039	NA	4.52%	20.99	12,114.2	2,543.0	-	Y	88.1	7.77	88.1
2038	7.50%	2039/2040	NA	4.52%	20.58	12,483.7	2,569.0	-	Y	90.3	6.46	90.3
2039	7.50%	2040/2041	NA	4.52%	16.49	12,864.5	2,121.4	-	Y	92.5	5.06	92.5
2040	7.50%	2041/2042	NA	4.52%	13.53	13,256.8	1,793.7	-	Y	94.2	4.01	94.2
2041	7.50%	2042/2043	NA	4.52%	10.23	13,661.2	1,397.3	-	Y	95.4	3.24	95.4
2042	7.50%	2043/2044	NA	4.52%	8.18	14,077.8	1,151.9	-	Y	96.1	2.83	96.1
2043	7.50%	2044/2045	NA	4.52%	7.95	14,507.2	1,153.1	-	Y	96.5	2.65	96.5
2044	7.50%	2045/2046	NA	4.52%	7.65	14,949.7	1,143.5	-	Y	96.8	2.49	96.8
2045	7.50%	2046/2047	NA	4.52%	6.79	15,405.7	1,046.8	-	Y	97.0	2.34	97.0
2046	7.50%	2047/2048	NA	4.52%	6.65	15,875.5	1,056.2	-	Y	97.2	2.31	97.2
2047	7.50%	2048/2049	NA	4.52%	6.54	16,359.7	1,069.4	-	Y	97.3	2.29	97.3
2048	7.50%	2049/2050	NA	4.52%	6.27	16,858.7	1,057.8	-	Y	97.4	2.28	97.4
2049	7.50%	2050/2051	NA	4.52%	6.07	17,372.9	1,053.8	-	Y	97.4	2.31	97.4
2050	7.50%	2051/2052	NA	4.52%	6.04	17,902.8	1,082.1	-	Y	97.4	2.38	97.4

Pennsylvania State Employees' Retirement System (SERS)

Annual Annuity Estimates–Current Law Vs. HB 727, A06859 Hybrid Design

(See the following page for supporting details and related clarifications.)

Class AA, Category 0 - Assumed Retirement Age is 60 (or Age 65 for Class A5), Pay in Final Year is $50,000 NOTE: This First Table is Purely Hypothetical, Since Class AA Members With Age 60 Superannuation Will Not Be Joining the Proposed Hybrid Plan			
	10 Years of Service	20 Years of Service	30 Years of Service
Current Plan (2.5% Accrual Rate)	$11,818	$23,825	$36,104
HB 727, A06859 Hybrid: Hybrid DB (2% Accrual Rate), No Opt 4 Withdrawal + Hybrid DC Plan Annuity	9,648	20,034	28,873

Class A3, Category 0 - Assumed Retirement Age is 65, Pay in Final Year is $50,000			
	10 Years of Service	20 Years of Service	30 Years of Service
Current Plan	$9,455	$19,060	$28,884
HB 727, A06859 Hybrid: Hybrid DB + Hybrid DC Plan Annuity	9,648	20,034	28,873

Class A3, Category 1 - Assumed Retirement Age is 55 (or Age 65 for Class A5), Pay in Final Year is $50,000			
	10 Years of Service	20 Years of Service	30 Years of Service
Current Plan	$9,455	$19,060	$28,884
HB 727, A06859 Hybrid: Hybrid DB + Hybrid DC Plan Annuity	9,648	20,034	28,873

Judges - Assumed Retirement Age is 70, Pay in Final Year is $150,000			
	10 Years of Service	20 Years of Service	30 Years of Service
Current Plan (Assuming Class E-1)	$56,728	$100,064	$144,418
HB 727, A06859 (Assuming Class A-5): Hybrid DB + Hybrid DC Plan Annuity	18,777	35,982	50,203

State Police - Assumed Retirement Age is 55, Pay in Final Year is $50,000		
	20 Years of Service	25 Years of Service
Current Plan	$25,000	$37,500
EXEMPT from HB 727, A06859 Hybrid DB & Hybrid DC	25,000	37,500

Pennsylvania State Employees' Retirement System (SERS)

Annual Annuity Estimates--Current Law Vs. HB 727, A06859 Hybrid Design

Basis for Determination of Annual Annuity Estimates & Related Clarifications

- Pay in the final year before retirement was assumed to be $50,000 for all except Judges; Judges final year pay assumed to be $150,000. Pay was projected backward using valuation salary scale assumptions.
- Hybrid Defined Benefit (DB) Plan same as Current DB Plan, except that retirement covered compensation will be limited to a "DB Compensation Limit", as follows:
  DB Compensation Limit = $50,000 in 2018, adjusted annually thereafter by 1% per year
- Hybrid Defined Contribution (DC) Plan applies to compensation that exceeds the DB Compensation Limit.
- Contribution assumptions included:
  - Hybrid DB Plan: 6.00% employee contributions on pay up to the DB Compensation Limit for 25 years.
  - Hybrid DC Plan: (1.00% employee contributions on pay up to the DB Compensation Limit for service less than 25 years) + (7.00% employee contributions on pay above DB Compensation limit before 25 years and on all salary after attaining 25 years of service)

  Note: Under this HB 727, A06859 Hybrid Design, State Police officers are exempt (with respect to State Police service) from both the Hybrid DB and the Hybrid DC Plans.
- Annual investment return assumption: DC – 6% per year
- It was assumed that annuities would become an available form of DC Plan distribution, and DC account balances were annuitized using the following conversion basis: 4% interest and RP-2014 unisex mortality.
- To determine how much the above annual annuities replace as a percentage of final pay, divide the benefit amount by the pay level assumed in the final year (either $50,000 or $150,000). This result is the replacement ratio, the portion of final income replaced by the plan benefit.
- Figures above are neither audited nor certified. Calculations reflect certain assumptions and are not based on any existing legislative language. Final actuarial results will vary from these estimates based on actual final legislative outcomes and underlying details.

Pennsylvania State Employees' Retirement System (SERS)

Annual Annuity Estimates–Current Law Vs. HB 727, A06859 Hybrid Design

(See the following page for supporting details and related clarifications.)

Class AA, Category 0 - Assumed Retirement Age is 60 (or Age 65 for Class A5), Pay in Final Year is $100,000 NOTE: This First Table is Purely Hypothetical, Since Class AA Members With Age 60 Superannuation Will Not Be Joining the Proposed Hybrid Plan			
	10 Years of Service	20 Years of Service	30 Years of Service
Current Plan (2.5% Accrual Rate)	$23,637	$47,650	$72,209
HB 727, A06859 Hybrid: Hybrid DB (2% Accrual Rate), No Opt 4 Withdrawal + Hybrid DC Plan Annuity	13,496	25,608	35,515

Class A3, Category 0 - Assumed Retirement Age is 65, Pay in Final Year is $100,000			
	10 Years of Service	20 Years of Service	30 Years of Service
Current Plan	$18,909	$38,120	$57,767
HB 727, A06859 Hybrid: Hybrid DB + Hybrid DC Plan Annuity	13,496	25,608	35,515

Class A3, Category 1 - Assumed Retirement Age is 55 (or Age 65 for Class A5), Pay in Final Year is $100,000			
	10 Years of Service	20 Years of Service	30 Years of Service
Current Plan	$18,909	$38,120	$57,767
HB 727, A06859 Hybrid: Hybrid DB + Hybrid DC Plan Annuity	13,496	25,608	35,515

Judges - Assumed Retirement Age is 70, Pay in Final Year is $150,000			
	10 Years of Service	20 Years of Service	30 Years of Service
Current Plan (Assuming Class E-1)	$56,728	$100,064	$144,418
HB 727, A06859 (Assuming Class A-5): Hybrid DB + Hybrid DC Plan Annuity	18,777	35,982	50,203

State Police - Assumed Retirement Age is 55, Pay in Final Year is $100,000		
	20 Years of Service	25 Years of Service
Current Plan	$50,000	$75,000
EXEMPT from HB 727, A06859 Hybrid DB & Hybrid DC	50,000	75,000

Pennsylvania State Employees' Retirement System (SERS)

Annual Annuity Estimates--Current Law Vs. HB 727, A06859 Hybrid Design

Basis for Determination of Annual Annuity Estimates & Related Clarifications

- Pay in the final year before retirement was assumed to be $100,000 for all except Judges; Judges final year pay assumed to be $150,000. Pay was projected backward using valuation salary scale assumptions.
- Hybrid Defined Benefit (DB) Plan same as Current DB Plan, except that retirement covered compensation will be limited to a "DB Compensation Limit", as follows:
  DB Compensation Limit = $50,000 in 2018, adjusted annually thereafter by 1% per year
- Hybrid Defined Contribution (DC) Plan applies to compensation that exceeds the DB Compensation Limit.
- Contribution assumptions included:
  - Hybrid DB Plan: 6.00% employee contributions on pay up to the DB Compensation Limit for 25 years.
  - Hybrid DC Plan: (1.00% employee contributions on pay up to the DB Compensation Limit for service less than 25 years) + (7.00% employee contributions on pay above DB Compensation limit before 25 years and on all salary after attaining 25 years of service)

  Note: Under this HB 727, A06859 Hybrid Design, State Police officers are exempt (with respect to State Police service) from both the Hybrid DB and the Hybrid DC Plans.
- Annual investment return assumption: DC – 6% per year
- It was assumed that annuities would become an available form of DC Plan distribution, and DC account balances were annuitized using the following conversion basis: 4% interest and RP-2014 unisex mortality.
- To determine how much the above annual annuities replace as a percentage of final pay, divide the benefit amount by the pay level assumed in the final year (either $100,000 or $150,000). This result is the replacement ratio, the portion of final income replaced by the plan benefit.
- Figures above are neither audited nor certified. Calculations reflect certain assumptions and are not based on any existing legislative language. Final actuarial results will vary from these estimates based on actual final legislative outcomes and underlying details.

Pennsylvania State Employees' Retirement System (SERS)

Annual Annuity Estimates--Current Law Vs. HB 727, A06859 Hybrid Design

(See the following page for supporting details and related clarifications.)

Class AA, Category 0 - Assumed Retirement Age is 60 (or Age 65 for Class A5), Pay in Final Year is $150,000 NOTE: This First Table is Purely Hypothetical, Since Class AA Members With Age 60 Superannuation Will Not Be Joining the Proposed Hybrid Plan			
	10 Years of Service	20 Years of Service	30 Years of Service
Current Plan (2.5% Accrual Rate)	$35,455	$71,474	$108,313
HB 727, A06859 Hybrid: Hybrid DB (2% Accrual Rate), No Opt 4 Withdrawal + Hybrid DC Plan Annuity	17,596	33,827	46,821

Class A3, Category 0 - Assumed Retirement Age is 65, Pay in Final Year is $150,000			
	10 Years of Service	20 Years of Service	30 Years of Service
Current Plan	$28,364	$57,180	$86,651
HB 727, A06859 Hybrid: Hybrid DB + Hybrid DC Plan Annuity	17,596	33,827	46,821

Class A3, Category 1 - Assumed Retirement Age is 55 (or Age 65 for Class A5), Pay in Final Year is $150,000			
	10 Years of Service	20 Years of Service	30 Years of Service
Current Plan	$28,364	$57,180	$86,651
HB 727, A06859 Hybrid: Hybrid DB + Hybrid DC Plan Annuity	17,596	33,827	46,821

Judges - Assumed Retirement Age is 70, Pay in Final Year is $150,000			
	10 Years of Service	20 Years of Service	30 Years of Service
Current Plan (Assuming Class E-1)	$56,728	$100,064	$144,418
HB 727, A06859 (Assuming Class A-5): Hybrid DB + Hybrid DC Plan Annuity	18,777	35,982	50,203

State Police - Assumed Retirement Age is 55, Pay in Final Year is $150,000		
	20 Years of Service	25 Years of Service
Current Plan	$75,000	$112,500
EXEMPT from HB 727, A06859 Hybrid DB & Hybrid DC	75,000	112,500

Pennsylvania State Employees' Retirement System (SERS)

Annual Annuity Estimates--Current Law Vs. HB 727, A06859 Hybrid Design

Basis for Determination of Annual Annuity Estimates & Related Clarifications

- Pay in the final year before retirement was assumed to be $150,000 for all. Pay was projected backward using valuation salary scale assumptions.
- Hybrid Defined Benefit (DB) Plan same as Current DB Plan, except that retirement covered compensation will be limited to a "DB Compensation Limit", as follows:
  DB Compensation Limit = $50,000 in 2018, adjusted annually thereafter by 1% per year
- Hybrid Defined Contribution (DC) Plan applies to compensation that exceeds the DB Compensation Limit.
- Contribution assumptions included:
  - Hybrid DB Plan: 6.00% employee contributions on pay up to the DB Compensation Limit for 25 years.
  - Hybrid DC Plan: (1.00% employee contributions on pay up to the DB Compensation Limit for service less than 25 years) + (7.00% employee contributions on pay above DB Compensation limit before 25 years and on all salary after attaining 25 years of service)

  Note: Under this HB 727, A06859 Hybrid Design, State Police officers are exempt (with respect to State Police service) from both the Hybrid DB and the Hybrid DC Plans.
- Annual investment return assumption: DC – 6% per year
- It was assumed that annuities would become an available form of DC Plan distribution, and DC account balances were annuitized using the following conversion basis: 4% interest and RP-2014 unisex mortality.
- To determine how much the above annual annuities replace as a percentage of final pay, divide the benefit amount by the pay level assumed in the final year ($150,000). This result is the replacement ratio, the portion of final income replaced by the plan benefit.
- Figures above are neither audited nor certified. Calculations reflect certain assumptions and are not based on any existing legislative language. Final actuarial results will vary from these estimates based on actual final legislative outcomes and underlying details.

HayGroup®

Actuarial Cost Note -
Projected Impact of Legislation Related to a
SERS Hybrid Defined Benefit (DB)/Defined Contribution (DC) Plan Design
Proposed by Representative Tobash –
HB 727, PN 1555, As Amended by A06859 & A06888

Hay Group has prepared this cost note in connection with the draft legislative language provided to us that sets forth a hybrid defined benefit (DB)/defined contribution (DC) plan design proposed by Representative Mike Tobash. Under this proposal, most employees who join SERS on or after January 1, 2017 would no longer be covered by SERS' current benefits, but rather would be covered by a hybrid DB/DC plan design including key features as described below. It is SERS' understanding that a corrective amendment is in the process of being introduced that will change the effective date to January 1, 2018 for new SERS members. This corrective amendment will provide the system ample time to implement a new defined contribution component. Please note that the new effective date has been referenced throughout this document, and all cost projections herein reflect an anticipated January 1, 2018 implementation.

Exemption for Pennsylvania State Police and Certain Other Hazardous Duty Employees

This proposal exempts the Pennsylvania State Police and certain other hazardous duty employees (identified specifically below) from the proposed new plan design. That is, under this proposal (hereafter, "HB 727, A06859 & A06888"), the Pennsylvania State Police and certain other hazardous duty employees would continue their SERS benefits as-is, except for several relatively minor changes. References hereafter in this note to "all employees hired or rehired after the hybrid plan start date" being subject to the proposed new DB/DC plan provisions should be understood, if not specifically excepted, to exclude Pennsylvania State Police and certain other hazardous duty employees.

For purposes of this actuarial cost note, "certain other hazardous duty employees" includes:

- An enforcement officer,
- A wildlife conservation officer,
- A Delaware River Port Authority policeman,
- A park ranger,
- A capitol police officer,
- A campus police officer employed by a State-owned educational institution, community college or The Pennsylvania State University and
- A police officer employed by Fort Indiantown Gap or other designated Commonwealth military installation or facility.

Note that the number of current active SERS members who are "certain other hazardous duty employees", as described above, is approximately 1,550 (or about 1.5% of all active members).

Hay Group has performed cost projections to approximate the impact on future SERS funding if HB 727, A06859 & A06888 were to become law. In this cost note and the attached schedules, we are presenting a summary of the key provisions of HB 727, A06859 & A06888 and the results of our cost projections and analyses.

More on HB 727, A06859 & A06888

HB 727, A06859 & A06888 would mandate that, with limited exceptions noted herein, all employees hired after the hybrid plan start date of January 1, 2018 would be covered by the proposed new hybrid DB/DC plan. Therefore, they would become participants in a new SERS hybrid DC plan, which would be separate from the SERS DB system. Each hybrid DC participant would have established for him/her an individual investment account within the SERS hybrid DC trust fund, which would be separate from the SERS DB fund.

Certain Educational Employees

We understand that the availability of the option of certain educational employees to elect membership in either SERS, PSERS or an independent retirement program approved by the employer (such as TIAA-CREF) would continue if HB 727, A06859 & A06888 were enacted. Absent information that would indicate otherwise, Hay Group has performed our cost analysis of this proposal assuming that future (post-HB 727, A06859 & A06888) hires will opt to join SERS at approximately the same rate (i.e., with about the same likelihood) as past (pre-HB 727, A06859 & A06888) hires.

Impact on Current SERS Members

HB 727, A06859 & A06888 would not change benefit provisions applicable to current SERS members or to members who join SERS prior to the hybrid plan start date, so long as such members remain continuously employed.

Current SERS members would not have an option to leave their existing classes of service and join the hybrid plan.

In general, the "footprint rule" will apply. That is, legacy SERS members who have a break in service and return to employment after the hybrid plan start date would return to their former class of service; however, they would also have a 45-day period after their return within which they could waive their prior class of service and join the hybrid plan prospectively.

New SERS Defined Benefit (DB) Class

HB 727, A06859 & A06888 would create "Class A-5," a new class of DB membership applicable to all SERS employees who are hired after the hybrid plan start date.

Class A-5 would be a new tier within the existent SERS DB system; the new structure would not be a separate plan and would not have a separate fund. Under this proposal, SERS would not be closed to new members; SERS would remain open to Class A-5 members into the future.

Although most existing SERS funding provisions would continue to apply, HB 727, A06859 & A06888 would enact legislation-related funding approaches that deviate somewhat from current State Employees' Retirement Code (SERC) rules. These provisions are discussed later in this note.

Proposed Hybrid DB/DC Design

This summarizes our understanding of key features of this proposed hybrid DB/DC design:

1. Formula for Single Life Annuity at Superannuation for Class A-5 members:
   2% X 5-Year Final Average Salary X Total Credited Service, not > 25 years

   No "buy-up" to 2.5% accrual rate would be available, as it has been under Act 120.

   The Final Average Salary (FAS) would generally be calculated by averaging the five highest calendar years of compensation, not to exceed the "Class A-5 Annual Compensation Limit" as defined below.

2. Class A-5 Annual Compensation Limit (ACL): All employees who are first hired after the hybrid plan start date would become members of the hybrid DB system and participants of the hybrid DC plan.

   As such, they would be subject to benefit provisions that are, in part, defined by this new term introduced under HB 727, A06859 & A06888, which plays a significant role in the coordination of the proposed hybrid DB and DC components.

   a. HB 727, A06859 & A06888 would define ACL in the SERC as follows: "For calendar year 2018, the amount of $50,000. For each subsequent calendar year, the Class A-5 annual compensation limit will be 1% greater than the previous year's amount, rounded to the nearest hundred dollars."

   b. With respect to the hybrid DB component, the ACL:
      i. Limits the amount of compensation each calendar year that would be used to determine a member's five-year FAS, and
      ii. Limits the amount of compensation upon which employee and employer normal contributions would be based for each calendar year during the member's first 25 years of service. (Compensation used for employer UAL amortization contributions is not limited.)

c. With respect to the hybrid DC component, the ACL would serve as the "breakpoint" for purposes of determining employee/employer contribution rates applicable each calendar year during the participant's first 25 years of service.

3. Class A-5 Service Limit: A second new limit which would play a significant role in coordination of the proposed hybrid DB and DC components is a maximum of 25 years of service credit (or attainment of 25 eligibility points, to use SERC terminology) for purposes of hybrid DB plan participation. That is, when determining participation and annuity benefits payable under the hybrid DB system, credited service for Class A-5 members would be limited to 25 years.

   a. With respect to the hybrid DB component, reaching the 25-year service limit would mark the point at which employee and employer contributions to fund the hybrid DB benefit cease. (Employer UAL amortization contributions, however, would continue.)

   b. With respect to the hybrid DC component, reaching the 25-year service limit would mark the point at which employee and employer contribution rates relative to salary below the ACL increase.

4. Potential Increase in Hybrid DB Annuity After Reaching Service Limit: A Class A-5 member who reaches the 25-year service limit and continues active employment thereafter could experience an increase in his/her accrued benefit as a result of increases in the five-year FAS which occur after reaching the service limit, as follows:

   a. Annual compensation, subject to the ACL, earned after reaching the 25-year service limit would be included among the calendar years of compensation eligible for inclusion in the FAS determination, and

   b. Annual indexing of 1% per calendar year in the ACL could result in higher salaries being factored into the FAS determination.

5. Contribution Rates under Proposed Hybrid Plan Design: See table that follows.

Proposed Hybrid Defined Benefit (DB)/Defined Contribution (DC) Plan Contribution Rates				
	First 25 Years of Service		After 25 Years of Service	
	Salary Up To Class A-5 ACL	Salary Over Class A-5 ACL	Salary Up To Class A-5 ACL	Salary Over Class A-5 ACL
Defined Benefit (DB)				
Employee, Applicable to All	6%	Not Applicable	Not Applicable	Not Applicable
Employer, Applicable to All	Actuarially Determined	Actuarially Determined	Actuarially Determined	Actuarially Determined
Defined Contribution (DC)				
Employee, Applicable to All	1%	7%	7%	7%
Employer, Applicable to All	0.5%	4%	4%	4%

6. Hybrid DB Superannuation (i.e., Normal Retirement Age): Age 65, with at least three years of credited service. No superannuation for anyone as a result of 35 years of service or Rule of 92.

7. Hybrid DB Early Retirement: If 25 years of service, eligible for early retirement, actuarially reduced from normal retirement age.

8. Hybrid DB Vesting: 10-year cliff. Refund of accumulated deductions (member contributions + 4% statutory interest) payable upon non-vested termination. Upon vested termination before 25 years of service, a deferred annuity commencing at age 65 superannuation is available. In general, members would be guaranteed to receive payments at least equal to their accumulated deductions.

9. Hybrid DB Disability and Death Benefits: Eligibility and benefits would generally be consistent with Act 120, adjusted for Class A-5 limits.

10. Hybrid DB Shared Risk Provision: If DB fund investment returns are low relative to actuarial assumptions, Class A-5 members could be subject to higher employee contribution rates. Projections attached to this note anticipate that the actuarially assumed investment returns are earned in all future years; therefore, for purposes of this cost note, this provision would not impact future SERS costs.

11. Hybrid DC Vesting: Immediate vesting for employee contributions and related earnings/losses; 3-year cliff for employer contributions and related earnings/losses.

12. Hybrid DC Disability and Death Benefits: Vested account balances would generally be available.

Proposed Changes to Current SERS Funding Provisions

As noted previously, under HB 727, A06859 & A06888, most existing funding provisions would be unaffected, including the Act 2010-120 employer contribution rate collars which would continue, as applicable; however, HB 727, A06859 & A06888 does include some new legislation-related funding provisions (described in Item 1 below) that deviate from current SERC funding. Also, HB 727, A06859 & A06888 would fund the unfunded accrued liability (UAL) over total (DB + DC) payroll (as described in Item 2 below).

1. Funding of Liabilities Arising from Legislation: With respect to changes in SERS' UAL that would arise from this legislation:

    a. the change in liability would be funded using a 20-year, level-dollar amortization starting July 1, 2018, and

    b. the cost of such amortization would be included in the SERS employer cost determination prior to, not after, applying the contribution rate collars, if they are still applicable.

2. Funding the Existing UAL and Future Gains/Losses: Current SERS amortization methods would continue to apply; however, the UAL contribution rate would be based upon total payroll, i.e., DB + DC payroll. More specifically, it would be the sum of total DB payroll (existing classes of service + Class A-5) plus the hybrid DC-only payroll, which includes all active pay under the combined DB system and DC plan.

Hybrid DB Plan – Employer Normal Cost and UAL

Hybrid DB Plan Employer Normal Cost

Based on the employer normal cost calculation mandated by the SERC, Hay Group has determined that the net employer normal cost for the hybrid DB tier expected to join SERS in 2018 (all Class A-5 new entrants) would be approximately 1.14 percent of payroll below the ACL.

This hybrid DB normal cost is significantly lower than the current normal cost of 4.52 percent of payroll primarily due to the following key differences in the proposed hybrid DB design versus the current SERS design:

- The hybrid DB design would limit pensionable compensation to the ACL ($50,000 increasing 1% per year, which is a lower rate of increase than average assumed annual pay increases) and credited service to 25 years (for benefit accrual and member contribution purposes), whereas no such limits currently apply. It should be noted that

these limits result in a net decrease in employer costs resulting from lower future benefit accruals, which reduce employer costs and lower future member contributions to the hybrid DB system, which increase employer costs.

- The hybrid DB design would base all Class A-5 benefit accruals on a five-year FAS (a longer, less generous averaging period than currently applicable).

- The hybrid DB design would eliminate superannuation eligibility for both 35 years of credited service and the "Rule of 92."

After the initial employer normal cost rate determination (which we expect would occur as a part of the December 31, 2016 actuarial valuation), the normal cost would be redetermined with each subsequent annual actuarial valuation, and would reflect changes that occur from year to year in (i) the demographic characteristics of each year's new entrant population, (ii) the ACL and (iii) the applicable actuarial assumptions.

It is our expectation that, over time, the rate of increase in the average salary (up to the ACL) for the annual new entrant cohort would be about 3.05 percent per year, consistent with annual salary schedule increases assumed in our valuations. Because the ACL would be scheduled to increase by 1 percent per year, over time, the actuarial present value of future *benefits* for the new entrant cohort would not increase as rapidly as the actuarial present value of future *compensation* for the new entrant cohort. Thus, spreading the normal cost over a relatively larger payroll base would translate into a gradual decline in the hybrid DB total normal cost rate as a percentage of covered payroll.

In order to properly allocate future employer funding of the SERS DB system between the employer normal cost and the UAL, we have projected future normal cost levels to estimate the impact of this gradual change. Based upon our hybrid plan funding projections, the employer normal cost rate (shown in the "Floor Contribution" column of the attached projections) starts at about 1.14 percent of payroll in fiscal 2017/2018 and decreases by about 0.0188 percent of payroll per year to reach a level of about 0.50 percent of payroll in fiscal 2051/2052, the end of our projection period.

Hybrid DB Plan UAL

If HB 727, A06859 & A06888 would become law, effective in fiscal 2017/2018, the SERS employer normal cost rate would decrease from the current 4.52 percent of payroll based upon Class A-3 new entrants to about 1.14 percent of payroll based on Class A-5 new entrants. At the same time, approximately $2.0 billion in liabilities that were previously scheduled to be funded via future employer normal cost payments would be added to SERS' UAL, thereby increasing the amount of annual funding required to amortize the UAL and causing SERS' funded status to decrease by about 2.4 percent.

Due to expected decreases in the employer normal cost rate (from about1.14 percent of payroll initially to about 0.50 percent in fiscal 2051/2052, as discussed above), the gradual shifting from future employer normal costs to UAL amortization would continue over the projection period. With each passing year, the amount of liability shifted would be deemed to be a liability loss (and an increment to the projected UAL), which would be funded like other projected actuarial gains and losses, using 30-year, level-dollar amortization. This aspect, though a relatively minor refinement, is included in the hybrid DB plan funding projections attached.

Projection of Future Costs for HB 727, A06859 & A06888

Based upon census data, asset data and actuarial assumptions underlying the SERS December 31, 2015 actuarial valuation (including an assumed investment return of 7.5 percent per year, compounded annually) and incorporating the proposed new hybrid plan design outlined above and reflecting funding provision changes as described, Hay Group has projected the future employer contributions required under HB 727, A06859 & A06888.

For purposes of these projections—which include three separate, distinct, and mutually exclusive future payroll streams to which employer funding rates will be applied—we have segmented the aggregate expected future SERS payroll into three projected sub-payrolls:

- Legacy DB Payroll: This is the projected future payroll attributable to current SERS members, members who join SERS prior to the hybrid plan start date and Pennsylvania State Police and certain other hazardous duty employees (as identified specifically above) hired after the hybrid plan start date, because the State Police and certain other hazardous duty employees will retain their current SERS benefit design (with one minor exception, namely, new State Police officers on or after July 1, 2018 will have voluntary overtime pay in excess of 10% of their base salary excluded from their covered compensation). Future employer cost rates to be spread over (applied to) this future payroll stream would be:

    - Hybrid DB employer normal cost, and
    - UAL amortization.

- Hybrid DB/DC Payroll: This is the projected future payroll attributable to Class A-5 members, with the ACL and 25-year service limit applied. Future employer cost rates to be spread over (applied to) this future payroll stream would be:

    - Hybrid DB employer normal cost,
    - UAL amortization, and
    - Hybrid DC employer contributions on DB/DC payroll (based on the "below limit" rate of 0.5% of pay).

- Hybrid DC-Only Payroll: This is the projected future payroll attributable to Class A-5 participants recognizing (i) only pay in excess of the ACL during the first 25 years of

credited service and (ii) all pay after 25 years of credited service. Future employer cost rates to be spread over (applied to) this future payroll stream would be:

- UAL amortization, and
- Hybrid DC employer contributions on DC-only payroll (based on the "above limit" rate of 4% of pay).

Based upon these projected payroll streams and the employer cost rates described above, the hybrid plan schedules attached project the following future employer costs/contributions by fiscal year:

- Expected Fiscal Year DB Contribution =
  [(Hybrid DB Employer Normal Cost Rate) X (Legacy DB Payroll + Hybrid DB/DC Payroll)] + [(UAL Amortization Rate) X (Legacy DB Payroll + Hybrid DB/DC Payroll + Hybrid DC-Only Payroll)]

- Expected Fiscal Year DC Contribution =
  [(Hybrid DC Employer "Below Limit" Contribution Rate) X (Hybrid DB/DC Payroll)] + [(Hybrid DC Employer "Above Limit" Contribution Rate) X (Hybrid DC-Only Payroll)]

Schedules Attached to This Cost Note

We have attached to this note the results of our funding projections, as follows:

- **HB 727, A06859 & A06888 – Hybrid DB/DC Plan Design**: Hybrid Plan For Post-2017 New Entrants, Other than State Police and Certain Other Hazardous Duty Employees; Current SERS Benefit Provisions for Pre-2018 Hires; Continuing Current SERS Funding Provisions, Except as Stated in Items 1 and 2 on page 5: This table presents our projection of future SERS funding through fiscal year 2051/2052 and reflects the impact of (i) the proposed change to a hybrid plan design (as outlined in pages 1-4) for new entrants, other than State Police and certain hazardous duty employees, on or after January 1, 2018 and (ii) revisions, though limited, to current SERS funding provisions (as described in Items 1 and 2 on page 5).

- **Baseline Projection:** This table presents, for purposes of comparison, the results of our December 31, 2015 actuarial valuation and our projection of future funding through fiscal year 2051/2052, assuming no changes to any of the current SERS benefit provisions or funding methodologies.

Results in Brief

As a result of a hybrid DB + DC plan design that provides less favorable overall retirement benefits than provided under current law, if HB 727, A06859 & A06888 would be enacted it would result in significant cumulative budgetary savings in future SERS funding. Specifically, the projections show estimated cumulative budgetary savings relative to the current SERS baseline through fiscal year 2051/2052 of approximately $6.9 billion.

In addition to the cumulative savings described above, it is important to note the eventual "transfer of risk" that would occur if HB 727, A06859 & A06888 were to become law. That is, the conversion of SERS from the pure DB system that it is today to a hybrid design with an ever-growing DC component, including participant-directed investments, would result in a gradual transfer of investment risk from SERS' employers to SERS' members (employees). By the end of the projection period (fiscal 2052), this DB/DC design would result in a substantial reduction of investment risk being borne by SERS employers, relative to the level of risk they currently bear.

Important Notes

Please note the following regarding our handling of the attached funding projections:

1. In performing our cost analyses and preparing this cost note and the attachments hereto, Hay Group has applied the proposed changes to current law as presented to us. We have not reviewed or opined on the legality of any aspect of this proposal.

2. Hay Group's past convention of showing results for employer cost projections such as these as percentages of payroll to two decimal places may be somewhat misleading. This level of precision is not really possible for estimates of this nature.

3. All of these projections are based upon the expectation that (i) for all years after 2015, the actual economic and demographic experience of SERS will be consistent with the underlying actuarial valuation assumptions and (ii) all employer contribution amounts shown in the "Expected FY Contribution" columns will, in fact, be contributed.

4. The attached projection schedules include a particularly important column of information that may warrant further explanation: "Cumulative (Savings) / Cost Relative to Baseline" shows the projected cumulative cost or savings in employer contributions (in millions of dollars) that would result under the HB 727, A06859 & A06888 hybrid DB/DC plan design versus under the current law (Baseline). In general, projected future savings, if any, are not assumed to be used to accelerate the pay down of subsequent SERS funding costs/liabilities. That is, under Hay Group's cost projection approach, in future years in which we project savings (i.e., we project employer costs to fund the proposal under consideration to be lower than projected Baseline costs), we do not assume that such projected savings will be used to increase the levels of subsequent SERS employer contributions to fund SERS.

5. The cost estimates included herein were based upon our December 31, 2015 actuarial valuation results, including the underlying census data, assets and actuarial assumptions.

Actuarial Certification

To the best of our knowledge, the information we are presenting herein is complete and accurate and all costs and liabilities have been determined in conformance with generally accepted actuarial principles and on the basis of actuarial assumptions and methods which are reasonable (taking into account the past experience of SERS and reasonable expectations) and which represent our best estimate of anticipated experience under the plan.

The actuaries certifying to this valuation are members of the Society of Actuaries or other professional actuarial organizations, and meet the General Qualification Standards of the American Academy of Actuaries for purposes of issuing Statements of Actuarial Opinion.

Respectfully submitted,
Korn Ferry Hay Group, Inc.

By: _____
Brent M. Mowery, F.S.A.
Member American Academy of Actuaries
Enrolled Actuary No. 14-3885

By: _____
Craig R. Graby
Member American Academy of Actuaries
Enrolled Actuary No. 14-7319

May 11, 2016

SERS Projected Employer Contributions
(Based Upon Final December 31, 2015 Valuation)

5/11/2016

HB 727, A06859 & A06888 - Exempting State Police and Other Hazardous Duty Employees (Correction Officers are Not Exempt) - Hybrid DB/DC Plan Design

Year	Investment Return	Fiscal Year	Floor Contribution	Projected DB Percent Contribution	Legacy DB Payroll ($ in millions)	Hybrid DB/DC Payroll ($ in millions)	Hybrid DC-Only Payroll ($ in millions)	Total Payroll ($ in millions)	Expected FY DB Contribution ($ in millions)	Expected FY DC Contribution ($ in millions)	Total DB+DC Contribution ($ in millions)	Total DB+DC Contribution as a % of DB+DC Pay	Annual (Savings) / Cost Relative to Baseline	Cumulative (Savings) / Cost Relative to Baseline	Funded Ratio (AV%)	UAL ($ in billions)	Funded Ratio (MV%)
2013	13.60%	2014/2015	5.00%	20.50	5,897.6	-	-	5,897.6	1,209.0	-	1,209.0	20.50	-	-	59.2	17.90	62.4
2014	6.40%	2015/2016	4.95%	25.00	6,021.7	-	-	6,021.7	1,505.4	-	1,505.4	25.00	-	-	59.4	18.17	61.1
2015	0.40%	2016/2017	4.52%	29.50	6,255.2	-	-	6,255.2	1,845.3	-	1,845.3	29.50	-	-	58.0	19.45	56.2
2016	7.50%	2017/2018	1.14%	31.42	5,307.0	126.3	12.7	6,446.0	2,024.9	1.1	2,026.0	31.43	(17.3)	(17.3)	56.3	21.50	54.4
2017	7.50%	2018/2019	1.12%	30.81	6,183.1	414.9	44.5	6,642.6	2,046.3	3.9	2,050.2	30.86	(23.0)	(40.3)	57.2	21.40	55.4
2018	7.50%	2019/2020	1.10%	30.60	6,068.3	693.1	83.8	6,845.2	2,093.5	6.8	2,100.3	30.68	(29.0)	(69.3)	57.5	21.59	56.6
2019	7.50%	2020/2021	1.08%	30.28	5,953.9	967.4	132.6	7,054.0	2,134.2	10.1	2,144.3	30.40	(34.9)	(104.1)	58.0	21.66	57.8
2020	7.50%	2021/2022	1.06%	29.52	5,837.2	1,240.4	191.5	7,269.1	2,143.6	13.9	2,157.5	29.68	(40.8)	(145.0)	59.2	21.33	59.0
2021	7.50%	2022/2023	1.05%	28.77	5,719.3	1,510.7	260.8	7,490.8	2,152.0	18.0	2,170.0	28.97	(46.9)	(191.9)	60.4	20.96	60.3
2022	7.50%	2023/2024	1.03%	28.02	5,593.1	1,783.9	342.3	7,719.3	2,159.4	22.6	2,182.0	28.27	(52.8)	(244.7)	61.7	20.54	61.6
2023	7.50%	2024/2025	1.01%	27.28	5,463.9	2,054.5	436.4	7,954.7	2,165.6	27.7	2,193.3	27.57	(58.7)	(303.4)	63.0	20.07	62.9
2024	7.50%	2025/2026	0.99%	26.55	5,334.2	2,319.6	543.6	8,197.3	2,171.2	33.3	2,204.5	26.89	(64.7)	(368.0)	64.3	19.56	64.3
2025	7.50%	2026/2027	0.97%	25.85	5,202.7	2,580.0	664.7	8,447.3	2,176.8	39.5	2,216.3	26.24	(70.4)	(438.4)	65.7	19.00	65.7
2026	7.50%	2027/2028	0.95%	25.16	5,073.4	2,831.2	800.4	8,705.0	2,182.3	46.2	2,228.5	25.60	(76.2)	(514.7)	67.1	18.39	67.1
2027	7.50%	2028/2029	0.93%	24.49	4,943.8	3,074.7	952.0	8,970.5	2,187.8	53.5	2,241.3	24.98	(81.9)	(596.6)	68.6	17.73	68.6
2028	7.50%	2029/2030	0.91%	23.84	4,807.7	3,316.0	1,120.4	9,244.1	2,193.3	61.4	2,254.7	24.39	(87.6)	(684.2)	70.1	17.02	70.1
2029	7.50%	2030/2031	0.89%	23.20	4,666.7	3,553.0	1,306.3	9,526.0	2,198.8	70.0	2,268.8	23.82	(93.1)	(777.3)	71.7	16.25	71.7
2030	7.50%	2031/2032	0.87%	22.59	4,520.3	3,786.1	1,510.1	9,816.6	2,204.4	79.3	2,283.7	23.26	(98.5)	(875.8)	73.4	15.42	73.4
2031	7.50%	2032/2033	0.86%	21.99	4,369.6	4,014.3	1,732.1	10,116.0	2,210.1	89.4	2,299.5	22.73	(103.6)	(979.4)	75.2	14.52	75.2
2032	7.50%	2033/2034	0.84%	21.41	4,213.5	4,239.9	1,971.1	10,424.5	2,215.8	100.0	2,315.8	22.22	(108.8)	(1,088.2)	77.0	13.55	77.0
2033	7.50%	2034/2035	0.82%	20.85	4,063.0	4,455.8	2,223.6	10,742.5	2,221.7	111.2	2,332.9	21.72	(114.0)	(1,202.1)	79.0	12.50	79.0
2034	7.50%	2035/2036	0.80%	20.30	3,917.1	4,663.3	2,489.7	11,070.1	2,227.7	122.9	2,350.6	21.23	(119.2)	(1,321.3)	81.0	11.37	81.0
2035	7.50%	2036/2037	0.78%	19.77	3,775.5	4,862.7	2,769.6	11,407.8	2,233.8	135.1	2,368.9	20.77	(124.6)	(1,445.9)	83.2	10.15	83.2
2036	7.50%	2037/2038	0.76%	17.55	3,634.4	5,057.8	3,063.5	11,755.7	2,039.3	147.8	2,187.1	18.60	(330.8)	(1,776.7)	85.6	8.84	85.6
2037	7.50%	2038/2039	0.74%	17.09	3,495.5	5,247.5	3,371.3	12,114.2	2,045.8	161.1	2,206.9	18.22	(336.1)	(2,112.8)	87.7	7.62	87.7
2038	7.50%	2039/2040	0.72%	16.65	3,359.6	5,431.5	3,692.6	12,483.7	2,052.4	174.9	2,227.3	17.84	(341.7)	(2,454.5)	89.9	6.30	89.9
2039	7.50%	2040/2041	0.70%	12.54	3,226.6	5,610.5	4,027.4	12,864.5	1,584.9	189.1	1,774.0	13.79	(347.4)	(2,801.9)	92.3	4.88	92.3
2040	7.50%	2041/2042	0.68%	9.55	3,096.3	5,774.5	4,386.1	13,256.8	1,236.6	204.3	1,440.9	10.87	(352.8)	(3,154.7)	94.1	3.83	94.1
2041	7.50%	2042/2043	0.67%	6.23	2,968.9	5,887.8	4,804.4	13,661.2	818.6	221.6	1,040.2	7.61	(357.1)	(3,511.8)	95.4	3.04	95.4
2042	7.50%	2043/2044	0.65%	4.15	2,844.7	5,957.1	5,276.1	14,077.8	550.8	240.8	791.6	5.62	(360.3)	(3,872.0)	96.1	2.61	96.1
2043	7.50%	2044/2045	0.63%	3.89	2,724.4	6,028.6	5,754.2	14,507.2	528.8	260.3	789.1	5.44	(364.0)	(4,236.0)	96.5	2.42	96.5
2044	7.50%	2045/2046	0.61%	3.57	2,609.2	6,102.4	6,238.0	14,949.7	495.4	280.0	775.4	5.19	(368.1)	(4,604.1)	96.8	2.24	96.8
2045	7.50%	2046/2047	0.59%	2.68	2,501.2	6,178.0	6,726.5	15,405.7	374.4	300.0	674.4	4.38	(372.4)	(4,976.5)	97.1	2.08	97.1
2046	7.50%	2047/2048	0.57%	2.53	2,400.4	6,256.5	7,218.7	15,875.5	359.9	320.0	679.9	4.28	(376.3)	(5,352.8)	97.2	2.03	97.2
2047	7.50%	2048/2049	0.55%	2.39	2,310.9	6,334.3	7,714.5	16,359.7	347.7	340.3	688.0	4.21	(381.4)	(5,734.3)	97.3	2.00	97.3
2048	7.50%	2049/2050	0.53%	2.10	2,233.9	6,412.0	8,212.8	16,858.7	310.0	360.6	670.6	3.98	(387.2)	(6,121.5)	97.4	1.97	97.4
2049	7.50%	2050/2051	0.51%	1.86	2,168.8	6,490.8	8,713.3	17,372.9	279.1	381.0	660.1	3.80	(393.7)	(6,515.2)	97.5	1.99	97.5
2050	7.50%	2051/2052	0.50%	1.82	2,115.3	6,571.3	9,216.2	17,902.8	279.8	401.5	681.3	3.81	(400.8)	(6,916.0)	97.5	2.03	97.5

SERS Projected Employer Contributions
(Based Upon Final December 31, 2015 Valuation)

5/11/2016

Baseline: December 31, 2015 Data and Assets; Current Entry Age Funding Method; Level Dollar Amortization; 5-Year Smoothing of Assets; 4.50% FY 16 Collar; 4.50% FY 17 Collar; 4.50% FY 18 Collar; 4.50% FY 19 Collar; 4.50% FY 20 Collar; 4.50% FY 21+ Collar; No Asset Fresh Start; Act 120 Benefit Provisions; 7.50% Liability Interest Rate Assumption; No Liability Fresh Start

Year	Investment Return	Fiscal Year	Ceiling Contribution	Floor Contribution	Projected Percent Contribution	Expected FY Payroll ($ in millions)	Expected FY Contribution ($ in millions)	(Savings) / Cost Relative to Current Law Contribution	GASB Compliant (Fiscal Year Contribution)	Funded Ratio (AV%)	UAL ($ in billions)	Funded Ratio (MV%)
2013	13.60%	2014/2015	NA	5.00%	20.50	5,897.6	1,209.0	-	N	59.2	17.90	62.4
2014	6.40%	2015/2016	NA	4.95%	25.00	6,021.7	1,505.4	-	Y	59.4	18.17	61.1
2015	0.40%	2016/2017	NA	4.52%	29.50	6,255.2	1,845.3	-	Y	58.0	19.45	56.2
2016	7.50%	2017/2018	NA	4.52%	31.70	6,446.0	2,043.3	-	Y	58.8	19.46	56.7
2017	7.50%	2018/2019	NA	4.52%	31.21	6,642.6	2,073.2	-	Y	59.6	19.42	57.7
2018	7.50%	2019/2020	NA	4.52%	31.11	6,845.2	2,129.3	-	Y	59.8	19.66	58.8
2019	7.50%	2020/2021	NA	4.52%	30.89	7,054.0	2,179.2	-	Y	60.2	19.79	60.0
2020	7.50%	2021/2022	NA	4.52%	30.24	7,269.1	2,198.3	-	Y	61.4	19.52	61.2
2021	7.50%	2022/2023	NA	4.52%	29.59	7,490.8	2,216.9	-	Y	62.6	19.22	62.5
2022	7.50%	2023/2024	NA	4.52%	28.95	7,719.3	2,234.8	-	Y	63.8	18.87	63.8
2023	7.50%	2024/2025	NA	4.52%	28.31	7,954.7	2,252.0	-	Y	65.1	18.48	65.0
2024	7.50%	2025/2026	NA	4.52%	27.68	8,197.3	2,269.2	-	Y	66.4	18.05	66.4
2025	7.50%	2026/2027	NA	4.52%	27.07	8,447.3	2,286.7	-	Y	67.7	17.58	67.7
2026	7.50%	2027/2028	NA	4.52%	26.48	8,705.0	2,304.7	-	Y	69.1	17.06	69.1
2027	7.50%	2028/2029	NA	4.52%	25.90	8,970.5	2,323.2	-	Y	70.5	16.51	70.5
2028	7.50%	2029/2030	NA	4.52%	25.34	9,244.1	2,342.3	-	Y	72.0	15.91	72.0
2029	7.50%	2030/2031	NA	4.52%	24.79	9,526.0	2,361.9	-	Y	73.5	15.26	73.5
2030	7.50%	2031/2032	NA	4.52%	24.27	9,816.6	2,382.2	-	Y	75.0	14.56	75.0
2031	7.50%	2032/2033	NA	4.52%	23.76	10,116.0	2,403.1	-	Y	76.7	13.80	76.7
2032	7.50%	2033/2034	NA	4.52%	23.26	10,424.5	2,424.6	-	Y	78.4	12.98	78.4
2033	7.50%	2034/2035	NA	4.52%	22.78	10,742.5	2,446.9	-	Y	80.2	12.09	80.2
2034	7.50%	2035/2036	NA	4.52%	22.31	11,070.1	2,469.8	-	Y	82.0	11.13	82.0
2035	7.50%	2036/2037	NA	4.52%	21.86	11,407.8	2,493.5	-	Y	84.0	10.09	84.0
2036	7.50%	2037/2038	NA	4.52%	21.42	11,755.7	2,517.9	-	Y	86.0	8.97	86.0
2037	7.50%	2038/2039	NA	4.52%	20.99	12,114.2	2,543.0	-	Y	88.1	7.77	88.1
2038	7.50%	2039/2040	NA	4.52%	20.58	12,483.7	2,569.0	-	Y	90.3	6.46	90.3
2039	7.50%	2040/2041	NA	4.52%	16.49	12,864.5	2,121.4	-	Y	92.5	5.06	92.5
2040	7.50%	2041/2042	NA	4.52%	13.53	13,256.8	1,793.7	-	Y	94.2	4.01	94.2
2041	7.50%	2042/2043	NA	4.52%	10.23	13,661.2	1,397.3	-	Y	95.4	3.24	95.4
2042	7.50%	2043/2044	NA	4.52%	8.18	14,077.8	1,151.9	-	Y	96.1	2.83	96.1
2043	7.50%	2044/2045	NA	4.52%	7.95	14,507.2	1,153.1	-	Y	96.5	2.65	96.5
2044	7.50%	2045/2046	NA	4.52%	7.65	14,949.7	1,143.5	-	Y	96.8	2.49	96.8
2045	7.50%	2046/2047	NA	4.52%	6.79	15,405.7	1,046.8	-	Y	97.0	2.34	97.0
2046	7.50%	2047/2048	NA	4.52%	6.65	15,875.5	1,056.2	-	Y	97.2	2.31	97.2
2047	7.50%	2048/2049	NA	4.52%	6.54	16,359.7	1,069.4	-	Y	97.3	2.29	97.3
2048	7.50%	2049/2050	NA	4.52%	6.27	16,858.7	1,057.8	-	Y	97.4	2.28	97.4
2049	7.50%	2050/2051	NA	4.52%	6.07	17,372.9	1,053.8	-	Y	97.4	2.31	97.4
2050	7.50%	2051/2052	NA	4.52%	6.04	17,902.8	1,082.1	-	Y	97.4	2.38	97.4

Pennsylvania State Employees' Retirement System (SERS)

Annual Annuity Estimates–Current Law Vs. HB 727, A06859 & A06888 Hybrid Design

(See the following page for supporting details and related clarifications.)

Class AA, Category 0 - Assumed Retirement Age is 60 (or Age 65 for Class A5), Pay in Final Year is $50,000 NOTE: This First Table is Purely Hypothetical, Since Class AA Members With Age 60 Superannuation Will Not Be Joining the Proposed Hybrid Plan			
	10 Years of Service	20 Years of Service	30 Years of Service
Current Plan (2.5% Accrual Rate)	$11,818	$23,825	$36,104
HB 727, A06859 & A06888 Hybrid: Hybrid DB (2% Accrual Rate), No Opt 4 Withdrawal + Hybrid DC Plan Annuity	9,648	20,034	28,873

Class A3, Category 0 - Assumed Retirement Age is 65, Pay in Final Year is $50,000			
	10 Years of Service	20 Years of Service	30 Years of Service
Current Plan	$9,455	$19,060	$28,884
HB 727, A06859 & A06888 Hybrid: Hybrid DB + Hybrid DC Plan Annuity	9,648	20,034	28,873

Class A3, Category 1 - Assumed Retirement Age is 55 (or Age 65 for Class A5), Pay in Final Year is $50,000			
	10 Years of Service	20 Years of Service	30 Years of Service
Current Plan	$9,455	$19,060	$28,884
HB 727, A06859 & A06888 Hybrid: Hybrid DB + Hybrid DC Plan Annuity	9,648	20,034	28,873

Judges - Assumed Retirement Age is 70, Pay in Final Year is $150,000			
	10 Years of Service	20 Years of Service	30 Years of Service
Current Plan (Assuming Class E-1)	$56,728	$100,064	$144,418
HB 727, A06859 & A06888 (Assuming Class A-5): Hybrid DB + Hybrid DC Plan Annuity	18,777	35,982	50,203

State Police - Assumed Retirement Age is 55, Pay in Final Year is $50,000		
	20 Years of Service	25 Years of Service
Current Plan	$25,000	$37,500
EXEMPT from HB 727, A06859 & A06888 Hybrid DB & Hybrid DC	25,000	37,500

Pennsylvania State Employees' Retirement System (SERS)

Annual Annuity Estimates--Current Law Vs. HB 727, A06859 & A06888 Hybrid Design

Basis for Determination of Annual Annuity Estimates & Related Clarifications

- Pay in the final year before retirement was assumed to be $50,000 for all except Judges; Judges final year pay assumed to be $150,000. Pay was projected backward using valuation salary scale assumptions.
- Hybrid Defined Benefit (DB) Plan same as Current DB Plan, except that retirement covered compensation will be limited to a "DB Compensation Limit", as follows:
  DB Compensation Limit = $50,000 in 2018, adjusted annually thereafter by 1% per year
- Hybrid Defined Contribution (DC) Plan applies to compensation that exceeds the DB Compensation Limit.
- Contribution assumptions included:
  - Hybrid DB Plan: 6.00% employee contributions on pay up to the DB Compensation Limit for 25 years.
  - Hybrid DC Plan: (1.00% employee contributions on pay up to the DB Compensation Limit for service less than 25 years) + (7.00% employee contributions on pay above DB Compensation limit before 25 years and on all salary after attaining 25 years of service)

  Note: Under this HB 727, A06859 & A06888 Hybrid Design, State Police officers are exempt (with respect to State Police service) and other Hazardous Duty employees (other than Correction Officers) are exempt from both the Hybrid DB and the Hybrid DC Plans.
- It was assumed that annuities would become an available form of DC Plan distribution, and DC account balances were annuitized using the following conversion basis: 4% interest and RP-2014 unisex mortality.
- To determine how much the above annual annuities replace as a percentage of final pay, divide the benefit amount by the pay level assumed in the final year (either $50,000 or $150,000). This result is the replacement ratio, the portion of final income replaced by the plan benefit.
- Figures above are neither audited nor certified. Calculations reflect certain assumptions and are not based on any existing legislative language. Final actuarial results will vary from these estimates based on actual final legislative outcomes and underlying details.

Pennsylvania State Employees' Retirement System (SERS)

Annual Annuity Estimates–Current Law Vs. HB 727, A06859 & A06888 Hybrid Design

(See the following page for supporting details and related clarifications.)

Class AA, Category 0 - Assumed Retirement Age is 60 (or Age 65 for Class A5), Pay in Final Year is $100,000
NOTE: This First Table is Purely Hypothetical,
Since Class AA Members With Age 60 Superannuation Will Not Be Joining the Proposed Hybrid Plan

	10 Years of Service	20 Years of Service	30 Years of Service
Current Plan (2.5% Accrual Rate)	$23,637	$47,650	$72,209
HB 727, A06859 & A06888 Hybrid: Hybrid DB (2% Accrual Rate), No Opt 4 Withdrawal + Hybrid DC Plan Annuity	13,496	25,608	35,515

Class A3, Category 0 - Assumed Retirement Age is 65, Pay in Final Year is $100,000

	10 Years of Service	20 Years of Service	30 Years of Service
Current Plan	$18,909	$38,120	$57,767
HB 727, A06859 & A06888 Hybrid: Hybrid DB + Hybrid DC Plan Annuity	13,496	25,608	35,515

Class A3, Category 1 - Assumed Retirement Age is 55 (or Age 65 for Class A5), Pay in Final Year is $100,000

	10 Years of Service	20 Years of Service	30 Years of Service
Current Plan	$18,909	$38,120	$57,767
HB 727, A06859 & A06888 Hybrid: Hybrid DB + Hybrid DC Plan Annuity	13,496	25,608	35,515

Judges - Assumed Retirement Age is 70, Pay in Final Year is $150,000

	10 Years of Service	20 Years of Service	30 Years of Service
Current Plan (Assuming Class E-1)	$56,728	$100,064	$144,418
HB 727, A06859 & A06888 (Assuming Class A-5): Hybrid DB + Hybrid DC Plan Annuity	18,777	35,982	50,203

State Police - Assumed Retirement Age is 55, Pay in Final Year is $100,000

	20 Years of Service	25 Years of Service
Current Plan	$50,000	$75,000
EXEMPT from HB 727, A06859 & A06888 Hybrid DB & Hybrid DC	50,000	75,000

Pennsylvania State Employees' Retirement System (SERS)

Annual Annuity Estimates--Current Law Vs. HB 727, A06859 & A06888 Hybrid Design

Basis for Determination of Annual Annuity Estimates & Related Clarifications

- Pay in the final year before retirement was assumed to be $100,000 for all except Judges; Judges final year pay assumed to be $150,000. Pay was projected backward using valuation salary scale assumptions.
- Hybrid Defined Benefit (DB) Plan same as Current DB Plan, except that retirement covered compensation will be limited to a "DB Compensation Limit", as follows:
  DB Compensation Limit = $50,000 in 2018, adjusted annually thereafter by 1% per year
- Hybrid Defined Contribution (DC) Plan applies to compensation that exceeds the DB Compensation Limit.
- Contribution assumptions included:
  - Hybrid DB Plan: 6.00% employee contributions on pay up to the DB Compensation Limit for 25 years.
  - Hybrid DC Plan: (1.00% employee contributions on pay up to the DB Compensation Limit for service less than 25 years) + (7.00% employee contributions on pay above DB Compensation limit before 25 years and on all salary after attaining 25 years of service)

  Note: Under this HB 727, A06859 & A06888 Hybrid Design, State Police officers are exempt (with respect to State Police service) and other Hazardous Duty employees (other than Correction Officers) are exempt from both the Hybrid DB and the Hybrid DC Plans.
- Annual investment return assumption: DC – 6% per year
- It was assumed that annuities would become an available form of DC Plan distribution, and DC account balances were annuitized using the following conversion basis: 4% interest and RP-2014 unisex mortality.
- To determine how much the above annual annuities replace as a percentage of final pay, divide the benefit amount by the pay level assumed in the final year (either $100,000 or $150,000). This result is the replacement ratio, the portion of final income replaced by the plan benefit.
- Figures above are neither audited nor certified. Calculations reflect certain assumptions and are not based on any existing legislative language. Final actuarial results will vary from these estimates based on actual final legislative outcomes and underlying details.

Pennsylvania State Employees' Retirement System (SERS)

Annual Annuity Estimates–Current Law Vs. HB 727, A06859 & A06888 Hybrid Design

(See the following page for supporting details and related clarifications.)

Class AA, Category 0 - Assumed Retirement Age is 60 (or Age 65 for Class A5), Pay in Final Year is $150,000 NOTE: This First Table is Purely Hypothetical, Since Class AA Members With Age 60 Superannuation Will Not Be Joining the Proposed Hybrid Plan			
	10 Years of Service	20 Years of Service	30 Years of Service
Current Plan (2.5% Accrual Rate)	$35,455	$71,474	$108,313
HB 727, A06859 & A06888 Hybrid: Hybrid DB (2% Accrual Rate), No Opt 4 Withdrawal + Hybrid DC Plan Annuity	17,596	33,827	46,821

Class A3, Category 0 - Assumed Retirement Age is 65, Pay in Final Year is $150,000			
	10 Years of Service	20 Years of Service	30 Years of Service
Current Plan	$28,364	$57,180	$86,651
HB 727, A06859 & A06888 Hybrid: Hybrid DB + Hybrid DC Plan Annuity	17,596	33,827	46,821

Class A3, Category 1 - Assumed Retirement Age is 55 (or Age 65 for Class A5), Pay in Final Year is $150,000			
	10 Years of Service	20 Years of Service	30 Years of Service
Current Plan	$28,364	$57,180	$86,651
HB 727, A06859 & A06888 Hybrid: Hybrid DB + Hybrid DC Plan Annuity	17,596	33,827	46,821

Judges - Assumed Retirement Age is 70, Pay in Final Year is $150,000			
	10 Years of Service	20 Years of Service	30 Years of Service
Current Plan (Assuming Class E-1)	$56,728	$100,064	$144,418
HB 727, A06859 & A06888 (Assuming Class A-5): Hybrid DB + Hybrid DC Plan Annuity	18,777	35,982	50,203

State Police - Assumed Retirement Age is 55, Pay in Final Year is $150,000		
	20 Years of Service	25 Years of Service
Current Plan	$75,000	$112,500
EXEMPT from HB 727, A06859 & A06888 Hybrid DB & Hybrid DC	75,000	112,500

Pennsylvania State Employees' Retirement System (SERS)

Annual Annuity Estimates--Current Law Vs. HB 727, A06859 & A06888 Hybrid Design

Basis for Determination of Annual Annuity Estimates & Related Clarifications

- Pay in the final year before retirement was assumed to be $150,000 for all. Pay was projected backward using valuation salary scale assumptions.
- Hybrid Defined Benefit (DB) Plan same as Current DB Plan, except that retirement covered compensation will be limited to a "DB Compensation Limit", as follows:
  DB Compensation Limit = $50,000 in 2018, adjusted annually thereafter by 1% per year
- Hybrid Defined Contribution (DC) Plan applies to compensation that exceeds the DB Compensation Limit.
- Contribution assumptions included:
  - Hybrid DB Plan: 6.00% employee contributions on pay up to the DB Compensation Limit for 25 years.
  - Hybrid DC Plan: (1.00% employee contributions on pay up to the DB Compensation Limit for service less than 25 years) + (7.00% employee contributions on pay above DB Compensation limit before 25 years and on all salary after attaining 25 years of service)

  Note: Under this HB 727, A06859 & A06888 Hybrid Design, State Police officers are exempt (with respect to State Police service) and other Hazardous Duty employees (other than Correction Officers) are exempt from both the Hybrid DB and the Hybrid DC Plans.
- Annual investment return assumption: DC – 6% per year
- It was assumed that annuities would become an available form of DC Plan distribution, and DC account balances were annuitized using the following conversion basis: 4% interest and RP-2014 unisex mortality.
- To determine how much the above annual annuities replace as a percentage of final pay, divide the benefit amount by the pay level assumed in the final year ($150,000). This result is the replacement ratio, the portion of final income replaced by the plan benefit.
- Figures above are neither audited nor certified. Calculations reflect certain assumptions and are not based on any existing legislative language. Final actuarial results will vary from these estimates based on actual final legislative outcomes and underlying details.