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Pennsylvania Public School Employees' Retirement System

Information Required Under Governmental Accounting Standards Board Statement No. 67 as of June 30, 2016

Document Version: R:\TOBIN\2016\September\PSERS09262016DDEQSN_FYE2016_GASB67.docx

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September 26, 2016

Board of Trustees
Pennsylvania Public School Employees'
Retirement System
5 North 5th Street
Harrisburg, Pennsylvania 17101

Members of the Board:

This valuation provides information concerning the Pennsylvania Public School Employees' Retirement System (PSERS) in accordance with the Governmental Accounting Standards Board (GASB) Statement No. 67, effective for the fiscal year ending June 30, 2016.

We certify that the information contained in this Actuarial Report has been prepared in accordance with generally accepted actuarial principles and practices. To the best of our knowledge, the information fairly presents the actuarial position of PSERS in accordance with the requirements of GASB Statement No. 67 as of June 30, 2016.

The Board of Trustees and staff of PSERS may use this report for the review of the operation of the System and as a source of information for the Commonwealth financial statements. The report may also be used in the preparation of the System's audited financial statements.

Use of this report for any other purpose or by anyone other than the Board of Trustees or the staff of PSERS may not be appropriate and may result in mistaken conclusions because of failure to understand applicable assumptions, methods, or inapplicability of the report for that purpose. Buck should be asked to review any statement to be made on the basis of the results contained in this report. Buck will accept no liability for any such statement made without prior review by Buck.

Future actuarial measurements may differ significantly from current measurements due to System experience differing from that anticipated by the economic and demographic assumptions, increases or decreases expected as part of the natural operation of the methodology used for these measurements, and changes in System provisions or applicable law. An analysis of the potential range of such future differences is beyond the scope of this valuation.

In preparing the actuarial results, we have relied upon information provided by the staff of PSERS regarding System provisions, System participants, System assets, contribution rates and other matters used in the actuarial valuation. Although we did not audit the data, we reviewed the data for reasonableness and consistency with the prior year's information. The accuracy of the results presented herein is dependent on the accuracy of the data.

As required under Section 8502(j) of the Retirement Code, experience studies are performed once in every five-year period. This valuation was prepared on the basis of the demographic and economic assumptions that were selected on the basis of the July 1, 2005 to June 30, 2010 Experience Review and adopted by the Board of Trustees at their March 11, 2011 meeting, which include a 7.50% per annum rate of investment return. As mandated by the Retirement Code, these assumptions will remain in effect for valuation purposes until such time the Board of Trustees adopts revised assumptions.

For purposes of GASB Statement No. 67, the System's total pension liability as of June 30, 2016 was determined by rolling forward the System's total pension liability as of June 30, 2015 to June 30, 2016. However, we recently completed the July 1, 2010 to June 30, 2015 Experience Review and the Board of Trustees, at their June 10, 2016 meeting, approved the use of the Experience Review's recommended demographic and economic assumptions, which include a 7.25% per annum rate of investment return, effective with the June 30, 2016 actuarial valuation. Paragraph 37 of GASB Statement No. 67 recommends that professional judgment should be used to consider whether the effect of the revised demographic and economic assumptions be included in the System's fiscal year-end total pension liability. Based on discussions with the staff of PSERS, the System's total pension liability as of June 30, 2016 reflects the change in demographic and economic assumptions recommended on the basis of the July 1, 2010 to June 30, 2015 Experience Review.

In our opinion, the actuarial assumptions used are appropriate for purposes of the valuation and are reasonably related to the experience of the System and to reasonable long-term expectations. The mortality improvement assumption was selected in accordance with Actuarial Standard of Practice No. 35.

This report was prepared under our supervision. We are Members of the American Academy of Actuaries. We 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 we are available to answer questions about it.

Buck Consultants, LLC

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Section I – GASB 67 Information

Notes to the Financial Statements for the Year Ended June 30, 2016

Summary of Significant Accounting Policies

Method used to value investments: Investments are reported at fair value.

Actuarial cost method: Entry Age Normal – Level Percent of Pay

System Description

System administration. The administrative staff of the Pennsylvania Public School Employees' Retirement System (PSERS or System) administers the System. The System is a governmental cost-sharing multi-employer defined benefit pension plan that provides retirement benefits to public school employees of the Commonwealth of Pennsylvania (Commonwealth). The members eligible to participate in the System include all full-time public school employees, part-time hourly public school employees who render at least 500 hours of service in the school year, and part-time per diem public school employees who render at least 80 days of service in the school year in any of the reporting entities in Pennsylvania.

The control and management of the System, including the investment of its assets, is vested in the Board of Trustees (Board). The Board consists of 15 members: the Secretary of Education, ex officio; the State Treasurer, ex officio; two Senators; two members of the House of Representatives; the executive secretary of the Pennsylvania School Boards Association, ex officio; two Governor appointees, at least one of whom shall not be a school employee or an officer or employee of the State of Pennsylvania; three who are elected by the active professional members of the System from among their number; one who is elected by annuitants from among their number; one who is elected by the active nonprofessional members of the System from among their number; and one who is elected by members of Pennsylvania public school boards from among their number. The chairman of the Board is elected by the Board members. Each ex officio member of the Board and each legislative member of the Board may appoint a duly authorized designee to act in their stead.

The Commonwealth's General Assembly has the authority to amend the benefit terms of the System by passing bills in the Senate and House of Representatives and sending them to the Governor for approval.

System membership. System membership consists of the following:

	June 30, 2014	June 30, 2015
Inactive System members or beneficiaries currently receiving	213,900	219,775
Inactive System members entitled to but not yet receiving	20,467	21,909
Non-participants valued for accumulated deductions	112,097	115,277
Beneficiaries entitled to a pending lump sum	1,459	1,446
Active System members	263,312	259,868
	611,235	618,275

Benefits provided. Please see Section III of the report for a summary of System provisions.

Contributions. The Board establishes contributions based on an actuarially determined contribution recommended by an independent actuary. The actuarially determined contribution is the estimated amount necessary to finance the costs of benefits earned by System members during the year, with an additional amount to finance a portion of any unfunded accrued liability. For the year ended June 30, 2016, the Commonwealth contributed $3,189,510,000 to the System. The calculation of the actuarially determined contribution is governed by applicable provisions of the Retirement Code, as described in Section II of this report.

Receivables

N/A.

Net Pension Liability

The components of the net pension liability were as follows:

(Amounts x $ 1,000)		June 30, 2015		June 30, 2016
Total pension liability	$	94,900,830	$	99,388,887
System fiduciary net position		(51,585,521)		(49,832,060)
Commonwealth's net position	$	43,315,309	$	49,556,827
System fiduciary net position as a percentage of the total pension liability		54.36%		50.14%

Actuarial Assumptions and Methods

The total pension liability as of June 30, 2016 was determined by rolling forward the System's total pension liability as of July 1, 2015 to June 30, 2016 using the following actuarial assumptions, applied to all periods included in the measurement. All other methods and assumptions used to determine the total pension liability are set forth in Section II.

a. Actuarial Cost Method

The actuarial cost method used to develop the total pension liability is the Entry Age Normal Cost - Level Percent of Pay method, as required by GASB Statement No. 67.

b. Long-Term Expected Rate of Return

The long-term expected rate of return on pension System investments was determined using a building-block method in which best-estimate ranges of expected future real rates of return (expected returns, net of pension System investment expense and inflation) are developed for each major asset class. These ranges are combined to produce the long-term expected rate of return by weighting the expected future real rates of return by the target asset allocation percentage and by adding expected inflation. Best estimates of arithmetic rates of return for each major asset class included in the System's target asset allocation as of June 30, 2016 are summarized in Appendix A, as provided by the System's investment consultant, Aon Hewitt.

c. Discount Rate

The discount rates used to measure the total pension liability were 7.50% as of June 30, 2015 and 7.25% as of June 30, 2016. Based on discussions with the staff of PSERS, the System's total pension liability as of June 30, 2016 reflects the change in economic assumptions recommended on the basis of the July 1, 2010 to June 30, 2015 Experience Review, which was adopted by the Board of Trustees at their June 10, 2016 meeting.

The projection of cash flows used to determine the discount rate assumed that Commonwealth contributions will continue to follow the current funding policy as prescribed by Act 120 of 2010. Based on those assumptions, the System's fiduciary net position was projected to be available to make all projected future benefit payments of current System members. Therefore, the long-term expected rate of return on pension plan investments was applied to all periods of projected benefit payments to determine the total pension liability, in accordance with the method prescribed by GASB Statement No. 67.

In the event of benefit payments not covered by the Plan's fiduciary net position, a municipal bond rate of 2.71% would be used to discount the benefit payments not covered by the Plan's fiduciary net position. The 2.71% rate equals the S&P Municipal Bond 20-Year High Grade Rate Index at June 30, 2016. The rate was 3.73% as of June 30, 2015.

The discount rate is the single rate that reflects (1) the long-term expected rate of return on System investments that are expected to be used to finance the payment of benefits, to the extent that the System's fiduciary net position is projected to be sufficient to make projected benefit payments and System assets are expected to be invested using a strategy to achieve that return, and (2) a yield or index rate for 20-year, tax-exempt general obligation municipal bonds with an average rating of AA/Aa or higher (or equivalent quality on another scale), to the extent that the conditions for use of the long-term expected rate of return are not met.

The projections of the Fiduciary Net Plan Position are based on contributions to the System in accordance with the provisions of Act 120 of 2010. Should contributions to the System be reduced from those based on the provisions of Act 120 of 2010, the results would reflect the new contribution policy and may result in the Fiduciary Net Plan Position not being sufficient to cover the System's benefit payments at some future date and thus lowering the discount rate used to determine the System's Total Pension Liability.

We believe these assumptions are reasonable for the purposes of the measurements required by the Statement.

Sensitivity of the Net Pension Liability to Changes in the Discount Rate

The following presents the net pension liability, calculated using the discount rate of 7.25%, as well as what the Commonwealth's net pension liability would be if it were calculated using a discount rate that is 1-percentage-point lower (6.25%) or 1-percentage-point higher (8.25%) than the current rate:

	1% Decrease (6.25%)	Current Discount Rate (7.25%)	1% Increase (8.25%)
Net Pension Liability (Amounts x $1,000)	$ 60,621,334	$ 49,556,827	$ 40,259,380

Schedules of Required Supplementary Information

Schedule of Changes in The Commonwealth's Net Pension Liability and Related Ratios

(Amounts x $1,000) Changes for the year	**Total Pension Liability (a)**	**Plan Net Position (b)**	**Net Pension Liability (a) – (b)**
Balances as of 6/30/2015	$ 94,900,830	$ 51,585,521	$ 43,315,309
Service Cost	$ 1,932,401	$ 0	$ 1,932,401
Interest Cost	7,028,292	0	7,028,292
Difference between Expected and Actual Experience	(348,429)	0	(348,429)
Changes in Assumption	2,236,118	0	2,236,118
Contribution – Employer	0	3,189,510	(3,189,510)
Contribution – Member	0	989,266	(989,266)
Net Investment Income (actual)	0	473,206	(473,206)
Refunds of Contributions	0	0	0
Benefit Payments (actual)	(6,360,325)	(6,360,325)	0
Plan Administrative Expense (actual)	0	(45,118)	45,118
Other Changes	0	0	0
Net Changes	$ 4,488,057	$ (1,753,461)	$ 6,241,518
Balances as of 6/30/2016	$ 99,388,887	$ 49,832,060	$ 49,556,827

System fiduciary net position as a percentage of the total pension liability	50.14%
Covered-employee payroll as of the July 1, 2015 actuarial valuation	$12,678,213
Net pension liability as a percentage of covered-employee payroll	390.88%

Notes to Schedule:

Benefit changes. None.

Changes of assumptions. Based on discussions with the staff of PSERS, the System's total pension liability as of June 30, 2016 reflects the change in demographic and economic assumptions recommended on the basis of the July 1, 2010 to June 30, 2015 Experience Review, which was adopted by the Board of Trustees at their June 10, 2016 meeting. This includes a change to the discount rate from 7.50% as of June 30, 2015 to 7.25% as of June 30, 2016. Please see Section II of the report for a summary of the revised demographic and economic assumptions.

Schedule of Commonwealth Contributions

(Amounts x $1,000)		2015		2016
Actuarially determined contributions	$	3,289,615	$	3,540,304
Contributions related to the actuarially determined contribution*		2,596,731		3,181,438
Contribution deficiency (excess)	$	692,884	$	358,866

* The fiscal year 2016 amount excludes purchase of service contribution amounts of $8,072.000.

Notes to Schedule

Valuation date: Actuarially determined contributions are calculated as of the June 30 preceding the fiscal year in which contributions are made. That is, the contribution calculated as of the June 30, 2015 actuarial valuation will be made during the fiscal year ended June 30, 2017.

The methods and assumptions used to determine the actuarially determined contributions to the System are set forth in Section II.

Schedule of Investment Returns

Rate of return. The money-weighted rate of return expresses investment performance, net of investment expense, adjusted for the changing amounts actually invested. The annual money-weighted rate of return on System investments, net of System investment expense (as provided by the System's investment consultant, Aon Hewitt) is as follows:

	2015	2016
Annual money-weighted rate of return, net of investment expenses*	3.08%	1.11%

* Provided to PSERS by the System's investment consultant, Aon Hewitt.

Section II – Actuarial Assumptions and Methods

Interest Rate: 7.50% per annum, compounded annually (adopted as of June 30, 2011). The components are 3.00% for inflation and 4.50% for the real rate of return.

Separation from Service: Illustrative rates of assumed separation from service are shown in the following table (adopted as of June 30, 2011).

	Annual Rate of:						
	Withdrawal						
Age	Less Than Five Years of Service	Five Years but Less Than 10 Years of Service	10 or More Years of Service	Death	Disability	Early Retirement[1]	Superannuation Retirement
				MALES			
25	12.50%	5.50%	2.00%	.037%	.024%		
30	10.50	3.20	2.00	.038	.024		
35	11.00	3.00	1.50	.056	.100		
40	13.00	3.50	1.25	.090	.180		
45	13.00	3.50	1.25	.121	.180		25.00%
50	13.00	3.50	1.70	.173	.280		25.00
55	11.00	3.50	3.00	.245	.430	15.00%	30.00
60	10.50	3.50	4.50	.363	.580	12.00	28.00
65				.592	.100		20.00
69				.810	.100		18.00
				FEMALES			
25	13.00%	8.50%	5.00%	.018%	.030%		
30	13.00	6.50	4.00	.019	.040		
35	13.00	5.50	3.00	.022	.060		
40	10.90	4.50	1.50	.035	.100		
45	10.90	4.00	1.50	.055	.150		30.00%
50	10.90	3.75	1.75	.085	.200		30.00
55	10.90	3.75	3.00	.133	.380	15.00%	30.00
60	10.90	4.50	5.50	.197	.380	15.00	30.00
65				.301	.130		25.00
69				.428	.130		20.00

1. Early Retirement – Age 55 with 25 years of service, but not eligible for Superannuation retirement.

Death after Retirement: The RP-2000 Combined Healthy Annuitant Tables (Male and Female) with age set back 3 years for both genders for healthy annuitants and for dependent beneficiaries. The RP-2000 Combined Disabled Tables (Male and Female) with age set back 7 years for males and set back 3 years for females for disabled annuitants. (A unisex table based on the RP-2000 Combined Healthy Annuitant Tables (Male and Female) with age set back 3 years for both genders assuming the population consists of 25% males and 75% females is used to determine actuarial equivalent benefits.) No specific additional provision has been made to reflect possible future improvements in mortality.

Salary Increase: Effective average of 5.50% per annum, compounded annually (adopted as of June 30, 2011). The components are 3.00% for inflation, 1% for real wage growth and 1.5% for merit or seniority increases. Representative values are as follows:

Age	Annual Rate of Salary Increase
20	10.75%
30	8.25
40	6.25
50	4.25
55	3.75
60	3.75
65	3.75
70	3.75

Payroll Growth: 3.50% per annum.

MISCELLANEOUS

Option 4 - Refund of Contributions Elections: 100% of Class T-C and Class T-D members are assumed to elect a refund of contributions and a reduced annuity.

Withdrawal Annuity: 90% of members are assumed to commence payment immediately and 10% are assumed to defer payment to superannuation age.

Optional Forms of Payment Factors: Actuarial equivalent benefits are determined based on a statutorily specified interest rate of 4% per year (since 1960). The mortality basis is the RP-2000 Healthy Annuitant Mortality Tables with both the male and female tables set back three years assuming the population consists of 25% males and 75% females.

METHODS

Asset Valuation Method for Pension Funding: A ten-year moving market average (five-year moving market average prior to June 30, 2010) value of assets that recognizes the 7.50% (8.00% prior to June 30, 2011, 8.25% prior to June 30, 2009, and 8.50% prior to June 30, 2008) actuarial expected investment return immediately and spreads the difference between the actual return on the market value of assets and the expected return on the actuarial value of assets over a period of ten years is prescribed for use in funding calculations under Act 120 of 2010. The averaging period is being phased-in from fiscal year 2006.

Actuarial Cost Method for Pension Funding: Entry Age Normal Cost Method (modified slightly as of June 30, 2005 to use a pay-weighted average normal contribution rate). The results of each June 30 valuation normally determine the employer contribution rate for the second succeeding fiscal year. Act 120 revised the funding method effective with the June 30, 2010 valuation. Act 120 mandated that the outstanding balance of the unfunded accrued liability as of June 30, 2010, including changes in the unfunded accrued liability due to the funding reforms of Act 120, be amortized over a 24-year period, as a level percent of pay, beginning July 1, 2011. Future valuation gains and losses, and changes in the unfunded accrued liability resulting from changes in actuarial assumptions and methods, are amortized over a 24-year period, as a level percent of pay. Future increases in the unfunded accrued liability due to legislation will be amortized over a 10-year period, as a level percent of pay. Act 120 also modified the employer pension contribution requirements by imposing collars on the rate at which employer contributions may rise from year to year. For the fiscal years ending June 30, 2012, June 30, 2013, and on or after June 30, 2014 the pension contribution rate can be no more than 3%, 3.5% and 4.5%, respectively, of total compensation of all active members, greater than the prior year’s final contribution rate. Beginning with the fiscal year in which the actuarially required contribution rate is less than the collared rate, the final contribution rate is the actuarially determined contribution rate, provided that the final contribution rate is not less than the employer normal contribution rate.

July 1, 2010 to June 30, 2015 Experience Review Assumptions

The following is a summary of the demographic and economic assumptions recommended on the basis of the July 1, 2010 to June 30, 2015 Experience Review, which was adopted by the Board of Trustees at their June 10, 2016 meeting.

Interest Rate: 7.25% per annum, compounded annually. The components are 2.75% for inflation and 4.50% for the real rate of return.

Separation from Service: Illustrative rates of assumed separation from service are shown in the following table.

	Annual Rate of:						
	Withdrawal						
Age	Less Than Five Years of Service	Five Years but Less Than 10 Years of Service	10 or More Years of Service	Death[1]	Disability	Early Retirement[2]	Superannuation Retirement
				MALES			
25	14.85%	5.70%	2.57%	.041%	.020%		
30	12.74	3.37	2.57	.039	.020		
35	13.39	3.21	1.50	.044	.058		
40	14.49	3.97	1.34	.050	.116		
45	14.42	4.53	1.37	.084	.160		19.16%
50	14.31	4.45	1.92	.138	.284		19.16
55	12.17	4.43	3.38	.233	.442	18.57%	26.59
60	12.43	5.58	5.57	.379	.582	14.42	30.87
65				.700	.087		21.39
69				1.067	.135		19.34
				FEMALES			
25	13.41%	7.47%	5.02%	.013%	.018%		
30	13.81	6.05	4.02	.017	.023		
35	14.22	5.53	2.85	.024	.055		
40	11.79	4.87	1.60	.032	.096		
45	11.54	4.51	1.65	.051	.135		15.00%
50	11.66	4.43	2.06	.088	.229		15.00
55	11.75	4.38	3.11	.133	.368	18.59%	10.02
60	12.25	5.97	6.40	.196	.360	17.05	35.77
65				.327	.082		22.23
69				.443	.118		22.79

1. These base mortality tables will then be projected on a generational basis using the Buck Modified 2015 projection scale from the valuation date.
2. Early Retirement – Age 55 with 25 years of service, but not eligible for Superannuation retirement.

Death after Retirement:

Male annuitants: RP-2014 male mortality table adjusted backward to 2006 with the MP-2014 mortality improvement scale and projected to the valuation date with the Buck Modified 2015 projection scale.

Female annuitants: RP-2014 female mortality table adjusted backward to 2006 with the MP-2014 mortality improvement scale, projected to 2013 with the Buck Modified 2015 projection scale and adjusted for credibility. This base mortality table will then be projected on a generational basis using the Buck Modified 2015 projection scale to the valuation date.

Disabled annuitants: RP-2014 male and female disabled mortality tables adjusted backward to 2006 with the MP-2014 mortality improvement scale and projected to the valuation date with the Buck Modified 2015 projection scale.

These base mortality tables will then be projected on a generational basis using the Buck Modified 2015 projection scale from the valuation date.

The Buck Modified 2015 projection scale is based on the same data and algorithm as the MP-2015 Projection Scale but trends to an ultimate improvement rate of 0.75% at most ages, achieving the ultimate rate over a fifteen year period following the end of the historic data used to construct MP-2015.

Salary Increase: Effective average of 5.00% per annum, compounded annually. The components are 2.75% for inflation and 2.25% for real wage growth and for merit or seniority increases. Representative values are as follows:

Age	Annual Rate of Salary Increase
20	10.10%
30	7.81
40	5.75
50	3.81
55	3.31
60	3.25
65	3.25
70	3.25

Payroll Growth: 3.50% per annum.

MISCELLANEOUS:

Option 4 - Refund of Contributions Elections: 80% of Class T-C and Class T-D members are assumed to elect a refund of contributions and a reduced annuity.

Withdrawal Annuity: 90% of members are assumed to commence payment immediately and 10% are assumed to defer payment to superannuation age.

Optional Forms of Annuity Payment at Retirement: Anticipated active member elections of optional forms of payment at retirement as follows:

- 50% will elect Maximum Single Life Annuity
- 20% will elect Option 1
- 20% will elect Option 2 (assuming males are 3 years older than females)
- 10% will elect Option 3 (assuming males are 3 years older than females)
- 0% will elect Option 4 (annuity payment)

Optional Forms of Payment Factors: Actuarial equivalent benefits are determined based on a statutorily specified interest rate of 4% per year (since 1960). The mortality basis is a blend of the healthy annuitant base mortality tables to be used for the June 30, 2016 actuarial valuation projected to 2020 with the Buck 2015 improvement scale assuming the population consists of 25% males and 75% females.

Section III – Summary of System Provisions

Pennsylvania Statutes, Title 24, PART IV. RETIREMENT FOR SCHOOL EMPLOYEES

MEMBERSHIP

For valuation purposes, all employees are considered to be full coverage. All employees who become members on and after January 1, 1966 are members of the dual coverage group. Dual coverage members contribute to both PSERS and to Social Security.

BENEFITS

Superannuation Annuity

Eligibility	Age 62, or age 60 with 30 years of service, or 35 years of service regardless of age. For Class T-E and Class T-F members, age 65 with a minimum of three years of service credit, or any combination of age and service that totals 92 with at least 35 years of credited service
Amount	2.5% of final average salary times years of school service and intervening military service. 2% of final average salary for non-school service, for members who did not elect Class T-D coverage, and for Class T-E members. Minimum of $100 per year of service. "Final average salary" means the highest average annual salary for any 3 years of service. Annual salary is subject to a limit of $200,000, as adjusted under Section 401(a)(17) of the Internal Revenue Code. As of June 30, 2014, the adjusted limit is $260,000. For members who elect coverage under Class T-D, the maximum benefit is equal to the limit established by Section 415 of the Internal Revenue Code. For Class T-E and Class T-F members, the maximum benefit is equal to the lesser of the limit established by Section 415 of the Internal Revenue Code or 100% of final average salary.

Early Retirement Annuity

Eligibility	Age 55 with 25 years of service.
Amount	Accrued benefit as of date of retirement, reduced 1/4% for each month by which commencement of payments precedes Superannuation Age. For members who elect coverage under Class T-D, the maximum benefit is equal to the limit established by Section 415 of the Internal Revenue Code. For Class T-E and Class T-F members, the maximum benefit is equal to the lesser of the limit established by Section 415 of the Internal Revenue Code or 100% of final average salary.

Withdrawal Annuity

Eligibility	5 years of service. For Class T-E and Class T-F members, ten years of service.
Amount	Accrued benefit deferred to superannuation retirement age or an actuarially reduced benefit payable immediately. Actuarially equivalent benefits are based on 4% interest and a unisex table based on the RP-2000 Combined Healthy Annuitant Tables (Male and Female) with age set back 3 years for both genders assuming the population consists of 25% males and 75% females.

Disability Annuity

Eligibility	5 years of service.
Amount	The standard single life annuity if the total number of years of credited service is greater than 16.667, otherwise the standard single life annuity multiplied by the lesser of the following ratios: (Y*/Y) or (16.667/Y) where Y is the number of years of credited service and Y* is the total years of credited service if the member were to continue as a school employee until superannuation retirement age (or at current age, if later). Minimum of $100 per year of service.

Return of Contributions

Eligibility	Death or separation from service and member does not qualify for other benefits.
Amount	Refund of accumulated deductions includes interest (less annuity payments received prior to death in the case of a retired member).

Death Benefit

Eligibility	Death of an active member or vestee who was eligible to receive an annuity.
Amount	The present value of the annuity that would have been effective if the member retired on the day before death. Option 1 assumed payable if no other option elected.

Normal and Optional Forms of Benefits

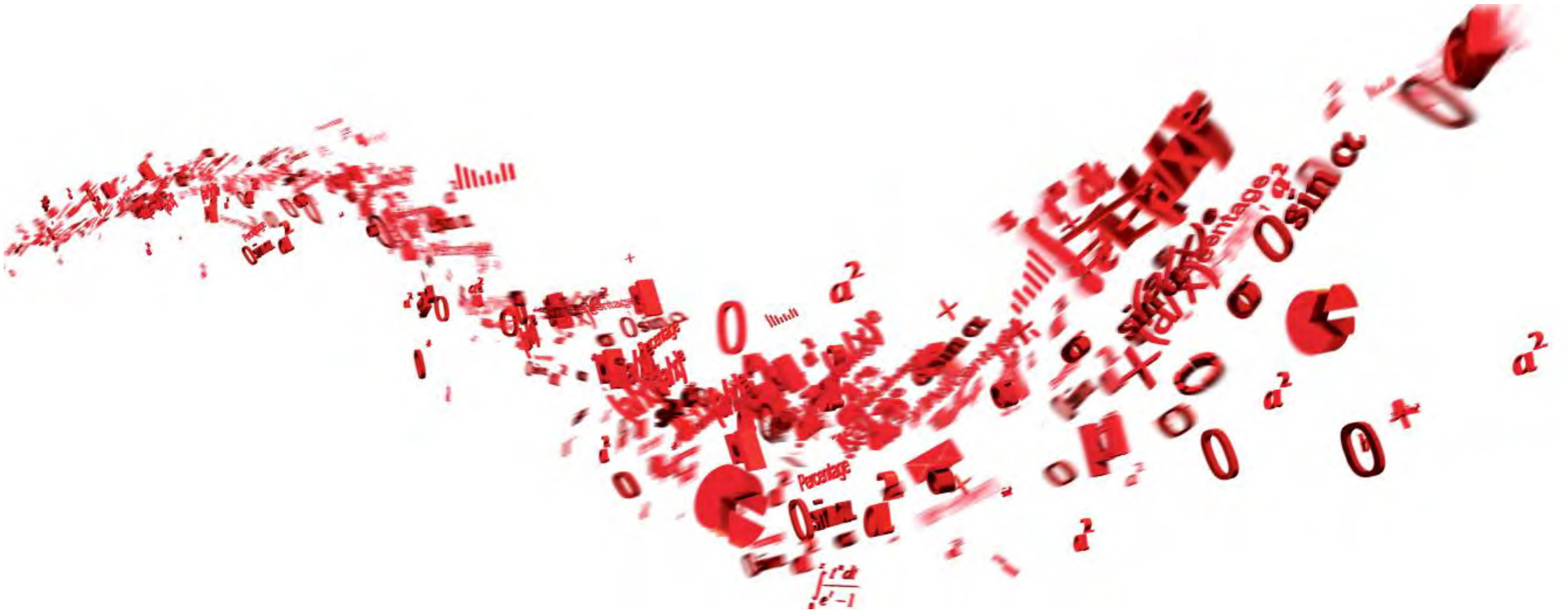
Normal Form:	Life annuity with a guaranteed payment equal to member contributions with interest.
Option 1:	Reduced benefit with refund of balance of present value of annuity at retirement over payments received. If balance is less than $5,000, benefit is paid in lump sum; otherwise, beneficiary may elect annuity and/or lump sum.
Option 2:	Joint and 100% survivorship annuity.
Option 3:	Joint and 50% survivorship annuity.

Option 4:	Benefit of equivalent actuarial value, including lump sum payment of member contributions. Class T-E and Class T-F members cannot elect to receive a lump sum payment of member contributions.

CONTRIBUTIONS

By Members	Members who elected coverage under Class T-D and who were most recently enrolled prior to July 22, 1983 contribute at a rate of 6½% of compensation, while members who elected coverage under Class T-D and who were most recently enrolled on or after July 22, 1983 contribute at a rate of 7½% of compensation. Members who did not elect coverage under Class T-D and who were most recently enrolled prior to July 22, 1983 contribute at a rate of 5¼% of compensation, while members who did not elect coverage under Class T-D and who were most recently enrolled on or after July 22, 1983 and prior to July 1, 2001 contribute at a rate of 6¼% of compensation. Anyone who enrolls or re-enrolls on or after July 1, 2001 automatically has coverage under class T-D for subsequent school service and subsequent intervening military service, and must contribute at a rate of 7½% of compensation. The base contribution rate for Class T-E members is 7½% of compensation. The base contribution rate for Class T-F members is 10.3% of compensation. Class T-E and Class T-F members are subject to a "shared-risk" employee contribution rate. Members benefit when investments of the fund are doing well and share some of the risk when investments underperform. The member contribution rate will stay within the specified range allotted for Class T-E or Class T-F members, but could increase or decrease every three years starting July 1, 2015 depending on investment performance. The member contribution rate can never go below the base rate of 7.5% for Class T-E members and 10.3% for Class T-F members, nor above 9.5% for Class T-E members and 12.3% for class T-F members. If the investment rate of return (less investment fees) is equal to or exceeds the assumed rate of return based on the prior ten-year period, the member contribution rate will decrease by .5%. Likewise, the member contribution rate will increase by .5% if the investment rate of return (less investment fees) during the ten-year period is 1.0% or more below the assumed rate of return. If the Retirement System is fully funded at the time of the comparison, the member contribution rate reverts back to the base rate for the Class. There shall not be an increase in the member contribution rate if there has not been an equivalent increase in the employer contribution rate over the previous three-year period. Until a full ten-year look back period is available, the investment return measurement period will begin on July 1, 2011.
By Commonwealth and School Districts	Balance of required contribution determined as normal contribution, accrued liability contribution, supplemental annuity contribution, experience adjustment factor and premium assistance contribution, is funded by the Commonwealth and the School District.

Appendix A – Information on Projected Returns by Asset Class Provided by Aon Hewitt



Pennsylvania School Employees' Retirement System

GASB 67 Reporting

September 2016

Aon Hewitt
Retirement and Investment

PSERS Total Fund FY 2016 Money Weighted Return

- **PSERS Total Fund Fiscal Year 2016 Money-Weighted Return (IRR)* is 1.11%.**

- Notes on inputs and methodology:
  - Market value of PSERS Total Fund at the beginning of fiscal year 2016 (July 1) is $51,394.1 million and market value of PSERS Total Fund at the end of fiscal year (ending June 30) is $48,946.9 million.
    - M*arket value and cash flows within the illiquid investments (private real estate and private markets) are reflected on a quarter lag.*
  - External net cash flows (inflows netted by outflows) are determined on a daily basis as they have occurred each month from July 1, 2015 to June 30, 2016.

**Please note PSERS Total Fund Fiscal Year 2016 Time-Weighted Return (TWR) is 1.29%.*

PSERS Expected Risk/Return – 30 Year Capital Market Assumptions

Asset Class	PSERS Long-Term Asset Allocation[1]	Expected Real Return	Expected Nominal Return	Expected Volatility
Global Public Equity (hedged)	22.50%	5.3%	7.5%	18.5%
Fixed Income[2]	28.5%	2.1%	4.2%	4.8%
Commodities	8.0%	2.5%	4.7%	17.0%
Absolute Return (HF)	10.0%	3.3%	5.5%	8.6%
Risk Parity	10.0%	3.9%	6.1%	11.8%
Infrastructure/MLPs	5.0%	4.8%	7.0%	14.5%
Real Estate	12.0%	4.0%	6.2%	12.5%
Alternative Investments (PE)	15.0%	6.6%	8.8%	24.5%
Cash	3.0%	0.2%	2.3%	2.0%
Financing (LIBOR)	-14.0%	0.5%	2.6%	2.0%
PSERS Total Fund	**100.0%**	**4.9%**	**7.1%**	**11.0%**
30 Year Expected Inflation	2.1%			

Note: All Expected Returns are geometric (compounded); Nominal Return = (1 + Real Return) x (1 + Inflation) -1
Please see next pages for detailed explanation of Aon Hewitt US Capital Market Assumptions (30 Years)- 2Q2016
[1]Per Exhibit B in Investment Policy Statement effective October 1, 2015.
[2]Fixed Income assumptions assume a blended allocation of 5% Core, 1% Non-US Developed (100% hedged), 2.5% Long Government, 6% High Yield, 2% Emerging Markets Debt, and 12% TIPS.

Explanation of Aon Hewitt US Capital Market Assumptions (30 Years)
2016 Q2

The following capital market assumptions were developed by Aon Hewitt's Global Asset Allocation Team and represent the long-term capital market outlook (i.e., 30 years) based on data at the end of the first quarter of 2016. The assumptions were developed using a building block approach, reflecting observable inflation and interest rate information available in the fixed income markets as well as Consensus Economics forecasts. Our long-term assumptions for other asset classes are based on historical results, current market characteristics, and our professional judgment.

Inflation – Expected Level (2.1%)
Based on Consensus Economics long-term estimates and our near-term economic outlook, we expect U.S. consumer price inflation to be approximately 2.1% during the next 30 years.

Real Returns for Asset Classes

Fixed Income

- **Cash (0.2%)** – Over the long run, we expect the real yield on cash and money market instruments to produce a real return of 0.2% in a moderate- to low-inflationary environment.
- **TIPS (1.0%)** – We expect intermediate duration Treasury Inflation-Protected Securities to produce a real return of about 1.0%.
- **Core Fixed Income (i.e., Market Duration) (1.2%)** – We expect intermediate duration Treasuries to produce a real return of about 0.4%. We estimate the fair value credit spread (credit risk premium - expected losses from defaults and downgrades) to be 0.8%, resulting in a long-term real return of 1.2%.
- **Long Duration Bonds – Government and Credit (1.7%)** – We expect Treasuries with a duration comparable to the Long Government Credit Index to produce a real return of 1.0%. We estimate the fair value credit spread (credit risk premium - expected losses from defaults and downgrades) to be 0.7%, resulting in an expected real return of 1.7%.

Explanation of Aon Hewitt US Capital Market Assumptions (30 Years)
2016 Q2

- **Long Duration Bonds – Credit (2.3%)** – We expect Treasuries with a duration comparable to the Long Credit Index to produce a real return of 1.0%. We estimate the fair value credit spread (credit risk premium - expected losses from defaults and downgrades) to be 1.3%, resulting in an expected real return of 2.3%.

- **Long Duration Bonds – Government (1.0%)** – We expect Treasuries with a duration of ~12 years to produce a real return of 1.0% during the next 30 years.

- **High Yield Bonds (4.3%)** – We expect intermediate duration Treasuries to produce a real return of about 0.4%. We estimate the fair value credit spread (credit risk premium - expected losses from defaults and downgrades) to be 3.9%, resulting in an expected real return of 4.3%.

- **Bank Loans (2.3%)** – We expect LIBOR to produce a real return of about 0.5%. We estimate the fair value credit spread (credit risk premium - expected losses from defaults) to be 1.8%, resulting in an expected real return of 2.3%.

- **Non-US Developed Bonds: 50% Hedged (0.5%)** – We forecast real returns for non-US developed market bonds to be 0.5% over a 30-year period after adjusting for a 50% currency hedge. We assume a blend of one-third investment grade corporate bonds and two-thirds government bonds. We also produce assumptions for 0% hedged and 100% hedged non-US developed bonds.

- **Emerging Market Bonds (Sovereign; USD) (2.9%)** – We forecast real returns for emerging market sovereign bonds denominated in USD to be 2.9% over a 30-year period.

- **Emerging Market Bonds (Corporate; USD) (3.5%)** – We forecast real returns for emerging market corporate bonds denominated in USD to be 3.5% over a 30-year period.

- **Emerging Market Bonds (Sovereign; Local) (3.9%)** – We forecast real returns for emerging market sovereign bond denominated in local currency to be 3.9% over a 30-year period.

- **Multi Asset Credit (MAC) (4.5%)** – We assume nominal returns from beta exposure to high yield, bank loans and emerging market debt to add 5.7% plus 1.0% from alpha (net of fees) over a 30-year period.

Explanation of Aon Hewitt US Capital Market Assumptions (30 Years)
2016 Q2

Equities

- **Large Cap U.S. Equity (4.3%)** – This assumption is based on our 30-year outlook for large cap U.S. company dividends and real earnings growth. Adjustments are made for valuations as needed.

- **Small Cap U.S. Equity (4.8%)** – Adding a 0.5% return premium for small cap U.S. equity over large cap U.S. equity results in an expected real return of 4.8%. This return premium is theoretically justified by the higher risk inherent in small cap U.S. equity versus large cap U.S. equity, and is also justified by historical data. In recent years, higher small cap valuations relative large cap equity has reduced the small cap premium.

- **Global Equity (Developed & Emerging Markets) (5.0%)** – We employ a building block process similar to the U.S. equity model using the developed and emerging markets that comprise the MSCI All-Country World Index. Our roll-up model produces an expected real return of 5.0% for global equity.

- **International (Non-U.S.) Equity, Developed Markets (5.2%)** – We employ a building block process similar to the U.S. equity model using the non-U.S. developed equity markets that comprise the MSCI EAFE Index.

- **Emerging Market Stocks (5.4%)** - We employ a building block process similar to the U.S. equity model using the non-U.S. emerging equity markets that comprise the MSCI Emerging Markets Index.

- **Equity Risk Insurance Premium Strategies- High Beta (4.1%)** – We expect nominal returns from insurance equity risk premium to average 4.5% plus 2.0% from cash & dividends over the next 30 years.

Alternative Asset Classes

- **Hedge Fund-of-Funds Universe (1.7%)** – The generic category “hedge funds” encompasses a wide range of strategies accessed through “fund-of-funds” vehicles. We also assume the median manager is selected and also allow for the additional costs associated with Fund-of-Funds management. A top-tier portfolio of funds (hedge fund-of-funds buy-list) could add an additional 1.1% in return at similar volatility based on alpha, lower fees and better risk management.

- **Hedge Fund-of-Funds Buy List (2.9%)** – The generic category of top-tier “hedge funds” encompasses a wide range of strategies accessed through “fund-of-funds” vehicles. We assume additional costs associated with Funds-of-Funds management. To use this category the funds must be buy rated or we advise on manager selection.

Explanation of Aon Hewitt US Capital Market Assumptions (30 Years)
2016 Q2

- **Broad Hedge Funds (3.1%)** – Represents a diversified portfolio of direct hedge fund investments. This investment will tend to be less diversified than a typical "fund-of-funds" strategy as there will be fewer underlying managers and will not include the extra layer of fees found in a Fund-of-Funds structure.

- **Broad Hedge Funds Buy List (4.4%)** – Represents a diversified portfolio of top-tier direct hedge fund investments. This investment will tend to be less diversified than a typical "fund-of-funds" strategy as there will be fewer underlying managers and will not include the extra layer of fees found in a Fund-of-Funds structure. To use this category the funds must be buy rated or we advise on manager selection.

- **Real Estate (4.0%)** – Our real return assumption for broad real estate market is based on a gross income of about 6.0%, management fees of roughly 2%, and future capital appreciation near the rate of inflation during the next 30 years. We assume a portfolio of equity real estate holdings that is diversified by property type and by geographic region.

- **Core Real Estate (3.3%)** – Our real return assumption for core real estate is based on a gross income of about 5.3%, management fees of roughly 2%, and future capital appreciation near the rate of inflation during the next 30 years. We assume a portfolio of equity real estate holdings that is diversified by property type and geographic region.

- **U.S. REITs (4.2%)** – Our real return assumption for U.S. REITs is based on income of 4.2% and future capital appreciation near the rate of inflation over the next 30 years. REITs are a sub-set of the U.S. small/mid cap equities.

- **Commodities (2.5%)** – Our commodity assumption is for a diversified portfolio of commodity futures contracts. Commodity futures returns are composed of three parts: spot price appreciation, collateral return, and roll return (positive or negative change implied by the shape of the future curve). We believe that spot prices will converge with CPI over the long run (i.e., 2.1%). Collateral is assumed to be LIBOR cash 0.5%. Also, we believe the roll effect will be near zero, resulting in a real return of approximately 2.5% for commodities.

- **Private Equity (6.6%)** – Our private equity assumption reflects a diversified fund of funds with exposure to buyouts, venture capital, distressed debt, and mezzanine debt.

Explanation of Aon Hewitt US Capital Market Assumptions (30 Years)
2016 Q2

- **Infrastructure (4.8%)** – Our infrastructure assumption is formulated using a cash flow based approach that projects cash flows (on a diversified portfolio of assets) over a 30 year period. Income and capital growth as well as gearing levels, debt costs and terms, relevant tax and management expenses are all taken into consideration. Our approach produces an expected real return of 4.8% for infrastructure.

- **Equity Risk Insurance Premium Strategies- Low Beta (3.6%)** – We assume nominal returns from cash of 2.3% + 3.5% from alpha.

Volatility / Correlation Assumptions

Assumed volatilities are formulated with reference to implied volatilities priced into option contracts of various terms, as well as with regard to historical volatility levels. For asset classes which are not marked to market (for example real estate), we “de-smooth” historical returns before calculating volatilities. Importantly, we consider expected volatility trends in the future – in recent years we assumed the re-emergence of an economic cycle and a loss of confidence in central bankers would lead to an increase in volatility. Correlation assumptions are generally similar to actual historical results; however, we do make adjustments to reflect our forward-looking views as well as current market fundamentals.

AHIC Capital Market Assumptions—Q2 2016 (30 Years)

		Expected Real Return[1]	Expected Nominal Return[1]	Expected Nominal Volatility
	Equity			
1	Large Cap U.S. Equity	4.3%	6.5%	17.0%
2	Small Cap U.S. Equity	4.8%	7.0%	23.5%
3	Global Equity IMI	5.1%	7.3%	19.0%
4	Global Equity IMI Hedged	5.3%	7.5%	18.5%
5	International Equity (Developed)	5.2%	7.4%	20.5%
6	Emerging Markets Equity	5.4%	7.6%	30.5%
	Fixed Income			
7	Cash (Gov't)	0.2%	2.3%	2.0%
8	Cash (LIBOR)	0.5%	2.6%	2.0%
9	TIPS	1.0%	3.1%	4.5%
10	Core Fixed Income	1.2%	3.3%	5.0%
11	Long Duration Bonds – Gov't / Credit	1.7%	3.8%	13.0%
12	Long Duration Bonds – Credit	2.3%	4.4%	14.5%
13	Long Duration Bonds – Gov't	1.0%	3.1%	12.5%
14	25-year Government Bond	0.8%	2.9%	20.5%
15	High Yield Bonds	4.3%	6.5%	12.0%
16	Non-US Developed Bond (100% Hedged)	0.6%	2.7%	4.0%
17	Emerging Market Bonds	2.9%	5.1%	13.5%
18	Emerging Market Bonds (Corporate USD)	3.5%	5.7%	11.5%
19	Emerging Market Bonds (Sov. Local)	3.9%	6.1%	14.5%
	Alternatives			
20	Hedge Funds[2]	3.3%	5.5%	8.6%
21	Real Estate (Broad Market)	4.0%	6.2%	12.5%
22	Core Real Estate	3.3%	5.5%	11.5%
23	Global REITs	4.2%	6.4%	19.0%
24	Commodities	2.5%	4.7%	17.0%
25	Private Equity	6.6%	8.8%	24.5%
26	Private Infrastructure	4.8%	7.0%	14.5%
27	Public Infrastructure	4.8%	7.0%	17.5%
28	Risk Parity[3]	3.9%	6.1%	11.8%
29	Gold	1.0%	3.1%	19.5%
	Inflation			
30	Inflation	0.0%	2.1%	1.5%

[1] All expected returns are geometric (long-term compounded; rounded to the nearest decimal) and net of investment fees.
[2] Hedge Fund assumptions developed as follows: 14% Event Driven, 7% CTA, 34% Global Macro, 21% Distressed Debt, 14% Fixed Income Arbitrage, 10% Cat. Bonds
[3] Risk Parity assumption developed as follows: 50% Global Equity, -100% LIBOR, 55% TIPS, 75% Intermediate Gov't. Bonds, 20% Commodities

AHIC Capital Market Assumptions—Q2 2016 (30 Years)

	Nominal Correlations	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	Large Cap U.S. Equity	**1.00**	0.92	0.95	0.97	0.79	0.72	0.08	0.08	-0.06	0.06	-0.01	0.09	-0.11	-0.12	0.62	0.02	0.44	0.41	0.48	0.58	0.40	0.39	0.66	0.31	0.69	0.38	0.89	0.83	0.01	0.05
2	Small Cap U.S. Equity	0.92	**1.00**	0.90	0.92	0.73	0.67	0.07	0.07	-0.06	0.05	-0.01	0.08	-0.11	-0.12	0.58	0.01	0.40	0.38	0.42	0.53	0.38	0.36	0.61	0.27	0.64	0.36	0.83	0.77	0.00	0.04
3	Global Equity IMI	0.95	0.90	**1.00**	0.97	0.92	0.84	0.07	0.07	-0.05	0.07	0.00	0.09	-0.11	-0.12	0.67	0.02	0.49	0.46	0.57	0.58	0.41	0.39	0.64	0.38	0.67	0.37	0.93	0.89	0.01	0.07
4	Global Equity IMI Hedged	0.97	0.92	0.97	**1.00**	0.84	0.81	0.10	0.10	-0.05	0.08	0.00	0.09	-0.12	-0.12	0.65	0.03	0.46	0.43	0.45	0.56	0.43	0.41	0.65	0.27	0.69	0.39	0.90	0.83	0.01	0.06
5	International Equity (Developed)	0.79	0.73	0.92	0.84	**1.00**	0.75	0.04	0.04	-0.04	0.06	0.00	0.08	-0.09	-0.10	0.60	0.00	0.44	0.43	0.61	0.51	0.37	0.36	0.54	0.42	0.56	0.32	0.86	0.85	0.01	0.08
6	Emerging Markets Equity	0.72	0.67	0.84	0.81	0.75	**1.00**	0.06	0.06	-0.04	0.07	0.01	0.09	-0.10	-0.11	0.68	0.03	0.50	0.47	0.54	0.44	0.34	0.32	0.49	0.30	0.53	0.30	0.77	0.74	0.01	0.06
7	Cash (Gov't)	0.08	0.07	0.07	0.10	0.04	0.06	**1.00**	0.99	0.45	0.50	0.22	0.19	0.24	0.16	0.14	0.66	0.16	0.08	0.00	0.06	0.14	0.15	0.08	0.22	0.09	0.11	0.11	0.19	0.05	0.54
8	Cash (LIBOR)	0.08	0.07	0.07	0.10	0.04	0.06	0.99	**1.00**	0.45	0.50	0.22	0.19	0.24	0.16	0.14	0.65	0.16	0.08	0.01	0.07	0.13	0.15	0.08	0.22	0.09	0.11	0.10	0.18	0.04	0.53
9	TIPS	-0.06	-0.06	-0.05	-0.05	-0.04	-0.04	0.45	0.45	**1.00**	0.46	0.25	0.22	0.27	0.19	0.09	0.25	0.12	0.03	-0.03	-0.03	0.01	0.02	-0.03	0.18	-0.04	0.00	-0.02	0.27	0.04	0.42
10	Core Fixed Income	0.06	0.05	0.07	0.08	0.06	0.07	0.50	0.50	0.46	**1.00**	0.84	0.85	0.75	0.65	0.33	0.64	0.49	0.22	0.12	0.14	0.08	0.09	0.06	0.08	0.06	0.06	0.07	0.28	0.01	0.17
11	Long Duration Bonds – Gov't / Credit	-0.01	-0.01	0.00	0.00	0.00	0.01	0.22	0.22	0.25	0.84	**1.00**	0.96	0.95	0.92	0.14	0.52	0.37	0.11	0.06	0.04	0.02	0.02	0.00	-0.02	0.00	0.01	-0.01	0.16	-0.01	-0.08
12	Long Duration Bonds – Credit	0.09	0.08	0.09	0.09	0.08	0.09	0.19	0.19	0.22	0.85	0.96	**1.00**	0.83	0.81	0.35	0.50	0.51	0.24	0.15	0.18	0.06	0.06	0.06	0.00	0.07	0.05	0.08	0.22	-0.01	-0.07
13	Long Duration Bonds – Gov't	-0.11	-0.11	-0.11	-0.12	-0.09	-0.10	0.24	0.24	0.27	0.75	0.95	0.83	**1.00**	0.97	-0.12	0.50	0.16	-0.04	-0.06	-0.12	-0.03	-0.03	-0.07	-0.03	-0.09	-0.04	-0.10	0.07	-0.01	-0.08
14	25-year Government Bond	-0.12	-0.12	-0.12	-0.12	-0.10	-0.11	0.16	0.16	0.19	0.65	0.92	0.81	0.97	**1.00**	-0.15	0.44	0.13	-0.06	-0.07	-0.12	-0.05	-0.04	-0.08	-0.06	-0.10	-0.05	-0.12	0.03	-0.02	-0.14
15	High Yield Bonds	0.62	0.58	0.67	0.65	0.60	0.68	0.14	0.14	0.09	0.33	0.14	0.35	-0.12	-0.15	**1.00**	0.13	0.73	0.62	0.57	0.58	0.28	0.27	0.42	0.38	0.47	0.27	0.65	0.67	0.02	0.19
16	Non-US Developed Bond (100% Hedged)	0.02	0.01	0.02	0.03	0.00	0.03	0.66	0.65	0.25	0.64	0.52	0.50	0.50	0.44	0.13	**1.00**	0.27	0.12	0.07	0.07	0.07	0.08	0.03	0.11	0.02	0.06	0.04	0.12	0.02	0.26
17	Emerging Market Bonds	0.44	0.40	0.49	0.46	0.44	0.50	0.16	0.16	0.12	0.49	0.37	0.51	0.16	0.13	0.73	0.27	**1.00**	0.70	0.61	0.50	0.20	0.20	0.30	0.21	0.32	0.19	0.46	0.51	0.01	0.09
18	Emerging Market Bonds (Corporate USD)	0.41	0.38	0.46	0.43	0.43	0.47	0.08	0.08	0.03	0.22	0.11	0.24	-0.04	-0.06	0.62	0.12	0.70	**1.00**	0.60	0.55	0.17	0.17	0.27	0.25	0.28	0.17	0.44	0.45	0.01	0.08
19	Emerging Market Bonds (Sov. Local)	0.48	0.42	0.57	0.45	0.61	0.54	0.00	0.01	-0.03	0.12	0.06	0.15	-0.06	-0.07	0.57	0.07	0.61	0.60	**1.00**	0.46	0.12	0.11	0.29	0.44	0.20	0.13	0.56	0.59	0.00	0.02
20	Hedge Funds[2]	0.58	0.53	0.58	0.56	0.51	0.44	0.06	0.07	-0.03	0.14	0.04	0.18	-0.12	-0.12	0.58	0.07	0.50	0.55	0.46	**1.00**	0.23	0.22	0.38	0.35	0.38	0.22	0.56	0.54	0.01	0.09
21	Real Estate (Broad Market)	0.40	0.38	0.41	0.43	0.37	0.34	0.14	0.13	0.01	0.08	0.02	0.06	-0.03	-0.05	0.28	0.07	0.20	0.17	0.12	0.23	**1.00**	0.96	0.49	0.08	0.35	0.20	0.41	0.35	0.01	0.08
22	Core Real Estate	0.39	0.36	0.39	0.41	0.36	0.32	0.15	0.15	0.02	0.09	0.02	0.06	-0.03	-0.04	0.27	0.08	0.20	0.17	0.11	0.22	0.96	**1.00**	0.47	0.08	0.33	0.20	0.39	0.33	0.01	0.09
23	Global REITs	0.66	0.61	0.64	0.65	0.54	0.49	0.08	0.08	-0.03	0.06	0.00	0.06	-0.07	-0.08	0.42	0.03	0.30	0.27	0.29	0.38	0.49	0.47	**1.00**	0.19	0.47	0.26	0.68	0.55	0.01	0.05
24	Commodities	0.31	0.27	0.38	0.27	0.42	0.30	0.22	0.22	0.18	0.08	-0.02	0.00	-0.03	-0.06	0.38	0.11	0.21	0.25	0.44	0.35	0.08	0.08	0.19	**1.00**	0.11	0.08	0.48	0.65	0.04	0.42
25	Private Equity	0.69	0.64	0.67	0.69	0.56	0.53	0.09	0.09	-0.04	0.06	0.00	0.07	-0.09	-0.10	0.47	0.02	0.32	0.28	0.20	0.38	0.35	0.33	0.47	0.11	**1.00**	0.32	0.60	0.54	0.01	0.05
26	Private Infrastructure	0.38	0.36	0.37	0.39	0.32	0.30	0.11	0.11	0.00	0.06	0.01	0.05	-0.04	-0.05	0.27	0.06	0.19	0.17	0.13	0.22	0.20	0.20	0.26	0.08	0.32	**1.00**	0.34	0.31	0.02	0.06
27	Public Infrastructure	0.89	0.83	0.93	0.90	0.86	0.77	0.11	0.10	-0.02	0.07	-0.01	0.08	-0.10	-0.12	0.65	0.04	0.46	0.44	0.56	0.56	0.41	0.39	0.68	0.48	0.60	0.34	**1.00**	0.88	0.02	0.13
28	Risk Parity[3]	0.83	0.77	0.89	0.83	0.85	0.74	0.19	0.18	0.27	0.28	0.16	0.22	0.07	0.03	0.67	0.12	0.51	0.45	0.59	0.54	0.35	0.33	0.55	0.65	0.54	0.31	0.88	**1.00**	0.02	0.25
29	Gold	0.01	0.00	0.01	0.01	0.01	0.01	0.05	0.04	0.04	0.01	-0.01	-0.01	-0.01	-0.02	0.02	0.02	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.04	0.01	0.02	0.02	0.02	**1.00**	0.10
30	Inflation	0.05	0.04	0.07	0.06	0.08	0.06	0.54	0.53	0.42	0.17	-0.08	-0.07	-0.08	-0.14	0.19	0.26	0.09	0.08	0.02	0.09	0.08	0.09	0.05	0.42	0.05	0.06	0.13	0.25	0.10	**1.00**